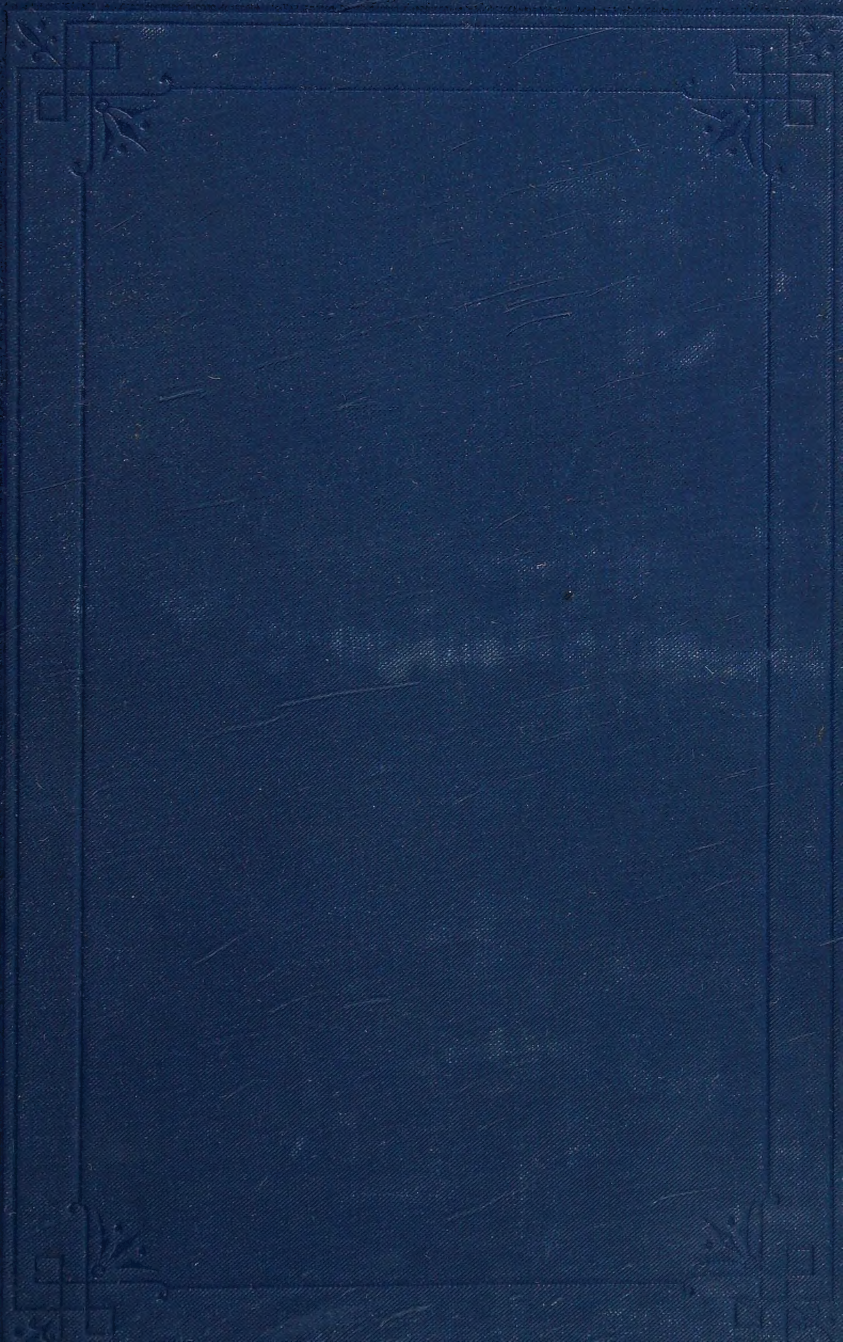

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# THE PRACTICAL MEDICINE SERIES OF YEAR BOOKS

COMPRISING TEN VOLUMES ON THE YEAR'S
PROGRESS IN MEDICINE AND SURGERY

ISSUED MONTHLY

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UNDER THE GENERAL EDITORIAL CHARGE OF

GUSTAVUS P. HEAD, M. D.

PROFESSOR OF LARYNGOLOGY AND RHINOLOGY, CHICAGO POST-GRADUATE MEDICAL SCHOOL.

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## VOLUME III

# THE EYE, EAR, NOSE AND THROAT

EDITED BY

CASEY A. WOOD, C. M., M. D.
ALBERT H. ANDREWS, M. D.
T. MELVILLE HARDIE, A. M., M. D.

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DECEMBER, 1902

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# Departments

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## The Eye

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# THE EYE.

# INTRODUCTION.

The past year has witnessed a decided advance in many departments of ophthalmology, notably in our treatment of muscle anomalies. For example, although it has long been known that in strabismus it is not enough to "straighten the squinting eye," it is only lately that we have insisted upon discussing the equally important question of inducing the deviating organ to functionate and so secure, as far as possible, binocular vision. The means by which this desirable end is accomplished—particularly non-operative means—has been rather neglected until late years. Again, the technic of advancement of the orbital muscles has also been greatly improved and one can certainly claim that this operation is now robbed of many of its uncertainties, discomforts and dangers. The therapeutics of ocular disorders has been enriched by many valuable remedies, notably those that accomplish their purposes not only promptly but painlessly; there seems a disposition, in America at least, to adopt those agents that, if no better than others already in use, give the patient as little inconvenience and cause him as little suffering as possible.

The arrangement of the ophthalmic portion of this Year Book differs somewhat from that of the previous volume. Greater prominence than before has been given to contributions intended for the student and the general practitioner. At the same time it is hoped that the veteran ophthalmologist will find sufficient of interest to justify a perusal of its pages.

The Editor desires particularly to acknowledge the courtesy of Dr. H. V. Würdemann in allowing him the extensive use he has made of those admirable abstracts for which the *Annals of Ophthalmology* is so justly praised. He also wishes to return thanks to Drs. de Schweinitz and Shumway for a similar liberty taken with their well selected reviews of current ophthalmic literature. The Editor has interjected, when occasion seemed to call for them, observations from his own experiences.

CASEY WOOD.

# THE EYE.

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## EXAMINATION OF THE EYE.

**Test Types.** Some years ago G. M. Gould devised a set of *test types* printed in white on a black background, to avoid the reflection or irradiation, often troublesome to the patient, experienced from the use of the ordinary Snellen types. This card certainly does not fatigue the eye and is of particular value when testing the refraction with a dilated pupil. Elmer G. Starr[1] proposes to improve matters still further by means of a series of letters of mixed blue and yellow segments (complementary colors) on a neutral (gray) background, or all of one color on a background of the other. He thinks that by employing these the glare and retinal fatigue incident to the usual test letters are much lessened, and that when a letter is built up of complementary colors instead of one solid mass of color it is more readily perceived, especially if the refractive error be accurately neutralized. In this way such types act as aids in selecting the proper lenses under subjective testing of the visual acuity. The accompanying diagram shows the arrangement of the colors in the test letters:

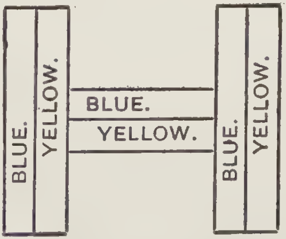

Fig. 1.

**Prism Notation.** To remedy the *confusion in prism numbering* Lucien Howe[2] was appointed chairman of a

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(1) Journal American Medical Assoc., Nov. 8, 1902.
(2) Ophthalmic Record, September, 1902.

committee of the American Ophthalmological Society to confer with other national societies in the hope that some uniform method might be adopted. It also seems desirable to ensure uniformity in methods of examining and reporting upon the state of the muscular balance. The Editor is certain that every ophthalmologist will sympathize with this movement and afford it every assistance in his power. As Howe points out, there is often some difference in the strength of the prism which we use. Confusion arises in part from lack of uniformity in the manner of using prisms to test the static condition—the so-called muscular balance—or from lack of uniformity in using them to test the dynamic condition, from the existence of different terms to express the same muscular conditions.

**Pupil Reflex.** Meyerhof[1] quotes Albrecht von Graefe (page 318 of the first number, first volume of his Archiv) as the original discoverer of the *pupil reaction on closing the lids,* preceding the publications of Galassi, Gifford, Westphal and others. Von Graefe explained it as a concomitant motion, which is upheld by the writer, who refers to the anatomy of the posterior longitudinal fascicle of Mendel between the root of the VII and the nucleus of the III nerves. Meyerhof repudiates the mechanical explanation of Schanz for the following reasons: By pulling the lids from the eyeball in closure of the lids pressure on the root of the iris can be avoided but the pupillary contraction still occurs. The latter cannot be obtained by pressing the fingers on the upper and lower limbus through the lids. It is not proved that such pressure produces obstruction in the blood vessels of the iris. Heine showed by experiments that congestion of the blood vessels of the iris does not cause miosis.

Speaking of the *comparative value of the cycloplegics* S. D. Risley[2] says that in patients presenting no fundus changes or anomalies of binocular vision there can be no question but that homatropin and duboisin may be, and often should be, employed, since the relatively brief duration of their effect upon the pupil and accommodation causes less annoyance and loss of time. But in groups of patients, examples of which have been given in two

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(1) Berliner klin. Wochensch., 5, 1902.
(2) Ophthalmic Record, January, 1902.

cases recorded, the longer duration of the cycloplegic is an important therapeutic factor, not to mention the greater anesthetic properties of atropin and hyoscyamin as compared, for example, with duboisin. The same end, however, may often be reached by the prolonged use of homatropin more frequently instilled, but sufficient time must be allowed for the subsidence of the hyperemia of the ocular tunics, and in the end it will be found no loss of time has been sustained through the use of the stronger and less transient effects of hyoscyamin or atropin.

A changeable disc for the *subjective examination* of patients under a mydriatic has been devised by F. B. Eaton.[1] It is intended to "stop" the pupil when the eye is under a cycloplegic, in order that during subjective testing of the refraction the real refraction, *i. e.,* in the visual zone, may be determined more quickly and accurately by preventing errors during the examination due to spherical aberration, irregular corneal curvature, etc. In short, the intention is to approximate the ideal of complete cycloplegia with an undilated pupil. The diaphragm fits the ordinary trial frames and optometer cells, and, as the cut shows, has a thin rotating disc by which perforations of 1 mm., 2 mm., etc., can be brought to the center of the large perforation in the diaphragm. The plan followed is to note the size of the patient's pupil under fair illumination before dilatation, and to begin the tests with a larger sized perforation, ending and "proving up" with a smaller one which corresponds to the patient's average normal pupil.

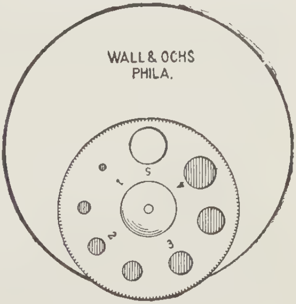

Fig. 2.

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(1) Ophthalmic Record, July, 1902.

## THE COLOR SENSE AND COLOR TESTS.

Regarding *tests for color-blindness* F. W. Eldridge-Green[1] remarks that the chief requirement is that color names be used and that the person to be examined should employ and understand the use of the color names, red, yellow, green and blue. The color-blind can be placed in the following groups: (1) Those who, whilst having a spectrum of the normal length, have a diminished number of units; that is to say, who see five, four, three, two or one color instead of the normal six; (2) those who, with or without the normal number of units, have a spectrum shortened at one or both ends. He would exclude from the marine and railway services all those individuals who belong to the following three classes: Those who possess a psychophysical color perception with three units or fewer than three; those who, whilst being able to perceive a greater number of units than three, have the red end of the spectrum shortened to a degree incompatible with recognition of a red light at a moderate distance; those who are affected with central scotoma for red or green. Explaining these classes the writer says the three unit class confuse yellow with red and green; they regard yellow as red-green, and blue as violet-green. The two unit regard green and red as almost identical. "It is very important," he says, "that persons belonging to the second class should be excluded, and yet none of the ordinarily used tests detect them. In the third class the condition is one in which a person might be able to distinguish colors easily when they are close to him, but fail to distinguish them at a distance, owing to the nerve fibers supplying the central portion of his retina being impaired."

Speaking of the actual test to be employed, Edridge-Green recommends the use of the lantern, varying the intensity and character of the light by certain kinds of neutral glass, without the knowledge of the candidate. The glasses he uses, like a mist or fog, are most transparent to the red rays at the extreme left of the spectrum, and where several such glasses are used together the light allowed to pass through them has a distinctly reddish hue.

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[1] Ophthalmic Review, February, 1902.

The normal-sighted easily recognize colored lights which have had their intensity diminished by neutral glass, but the color-blind find great difficulty in distinguishing the colors under these circumstances.

**Color Test.** C. A. Oliver[1] has prepared a modification of *Abney's "pellet test" for the detection of central scotomata.* As can be seen in the sketch, Oliver's contrivance practically consists of a wooden disc, upon the upper surface of which definitely tinted spherical pellets are loosely laid, the whole being covered with a transparent lid. The disc, which has been painted dead black and which is ten centimeters in diameter, is constructed like a plano-concave lens, with its upper concave surface made equal to the curvature seen in a minus spherical lens of four diopters' strength. The lid, which is of clear plane glass, surrounded by a bevelled rim of blackened metal, is hinged upon the disc base and is fixed in position by a metallic push spring-clip. The pellets, each of which is four millimeters in diameter, are composed of ivory, and are definitely gauged in their relative tintings to equal degrees of color-saturation. A pair of forceps accompanies the box.

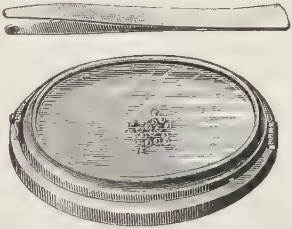

Fig. 3. Oliver's Color Test.

The writer thinks the test is best applied with one eye at a time, and that it must be regarded as a sort of preliminary, clinical examination, to be supplemented by the usual perimetric measurements.

The apparatus, placed upon some broad black surface such as a large dead-black table cloth, is then brought into view. The green pellet is removed from the rest of the color pellets in the color tray and laid upon the cloth alongside of the forceps. The color tray with the remaining pellets is left open and exposed. The patient is shown the separated pellet and the forceps. Nothing is said to him in regard to the name of the tint of the color. He is then requested to pick up a pellet with the forceps and hold it in the position before him at which it seems the brightest and the plainest. If he holds it eccentrically or turns his head to one side in order to better see the pellet, his defect will become quite evident. He is then asked to hold his head in such a position that his exposed eye is situated at some forty to fifty centimeters' distance directly above the color tray. While in this situation he is made to drop the pellet among its fellows in the color tray. The moment that the pellet has been placed in the tray the box is given a slight twist so that the pellets will be made to assume new relative positions. This done, the patient is requested to select the pellet from among its companions. If he has a central scotoma for green of but a couple of degrees in diameter when the test tray is held in this position, it will be almost impossible for him to regain the green color pellet—thus again objectively showing the central field defect for the perception of green and at the same time objectively proving its existence. The test is to be repeated with the fellow eye, and if desired, with the red, the blue, and the yellow series of pellets.

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[1] Annals of Ophthalmology, July, 1902.

## REFRACTION; AMETROPIA AND ITS TREATMENT.

**Refraction Tests.** No better *introduction to the study of refraction* has been written for years past than a recent simple but effective chapter on that subject by Swan Burnett.[1] The writer first draws our attention to the extremely large number of instruments of precision used for the exact measurement of the refraction of the eye and yet the cry is still constantly for more certainty and satisfaction, in the treatment of the largest contingent of patients that come to the ophthalmic surgeon for relief. An approximate adjustment of glasses is resented by their highly organized or shattered nervous systems, almost as much as no correction at all. It is the last half or quarter or possibly even less of a diopter, and the last two or three degrees of axis inclination that counts; and marks, it may be, the boundary between happiness and despair. Another, not unimportant, factor is a feeling for the necessity of the

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(1) Ophthalmic Record, January, 1902.

most careful work among American practitioners themselves, and a conscientious realization of what is expected of them as, on the whole, the most thorough and painstaking refractionists in the world today. For it is a fact, now generally admitted, that Americans demand, and are furnished with, better fitting glasses—optically and otherwise—than our cousins over the sea. For the general run of cases—perhaps a majority—a fairly close approximate correction of ametropia usually suffices to give satisfaction. In a not inconsiderable minority, a large amount of the refractive error can and does go uncorrected because the patients do not suffer, and are not willing to submit to the slavery of glasses. In fact, we find that the lower grades of ametropia are those that give us the most trouble. These cases, of the uncomplaining, we of course leave out of consideration in this thesis.

The human eye is not an optical instrument constructed on a fixed and uniform plan, even in the so-called normal optical condition. There are as many variations from a conventional standard almost, as there are eyes. Small these differences may be in some instances, but still demonstrable even by our relatively coarse instruments in every-day use. Take any dozen individuals, consecutively, and examine them with the ophthalmometer of Javal, and no two persons will be found (and hardly the two eyes of the same person) whose corneal radii are exactly the same; and the refraction of the cornea will bear no constant relation to the refraction of the eye as a whole. And it is now known from our abundant experience that the astigmatism of the cornea, as measured by that most ingenious instrument, gives us no uniformly trustworthy evidence as to the actual amount from which the whole eye suffers. It is these fundamental inconstancies of construction, of which this is only one, that bar the way to a reliable application of any one of our objective instruments or methods for the determination of the refractive condition of the eye.

For just these same reasons the shadow-test, which obtains its results from the refraction of the eye as a whole, cannot be relied upon with certainty, notwithstanding the claim of some experts that they can determine the refraction within a quarter of a diopter. In some eyes this may be possible, but an accuracy in the general run of cases to a half-diopter is something to be thankful for, and there are not a few cases in which the movements of the shadowed area are entirely misleading. This is especially manifest when the eye is under the influence of a mydriatic—the wide pupil opening up all the refractive irregularities the eye is possessed of. This method of examination requires more than any other perfectly clear media for its best results.

Nothing in this should be construed as a disparagement of any of the objective methods at our disposal. Each one gives us most valuable aid, and no case should be considered as thoroughly examined until each has been applied with all the accuracy possible. It is a matter of regret that we do not have more at our command. We must not forget, however, that there is a personal equation on the part of the observer which must always be reckoned with, and which may prove in the ultimate analysis an important factor in our difficulties. Nothing is truer than the apothegm of Hippocrates that "observation is difficult" when applied to the determination of the refraction of the human eye. After all, what we are searching for is the glass that shall give the patient the best and most comfortable vision; and this being the case, the court of last appeal must be the trial lenses and the test-types. But even when we have arrived here with all the data the various objective methods of the ophthalmometer, opthalmoscope and shadow-test have furnished us, our real trials seem, in most cases, to have only begun.

There is nothing, then, left but a patient and painstaking work with the trial case, having in mind always an ideal refractive condition, based upon the knowledge obtained by all the objective methods of examination, to which we should endeavor to attain through the sense of the patient. In this final determination time is a most important factor. There must be no feeling of hurry, either on the part of the patient or surgeon. A crowded waiting room is inimical to the best refraction work. To try to finish a case of even ordinary refraction, or what appears to be such, at one sitting, is to attempt the impossible. A number of seances are often required, and, even then, it may be necessary to order glasses for trial or experimentation in order to get important information, which can be obtained in no other way. The demand for this work is for tact in handling people, quickness in seizing suggestions, and, above all, infinite forbearance and untiring patience on the part of the examiner. He will be most successful with his refraction cases who possesses these qualities in the supremest degree.

**Myopia and Its Treatment.** In a thoughtful article by Priestley Smith[1] on *pernicious myopia* the writer says that it is often possible to predict the future of most cases of short sight. We must particularly regard: 1. The age of patient—other things equal, the younger the patient the more likely is the myopia to increase in degree. 2. Degree of myopia—other things equal, the higher the myopia the more likely it is to increase. 3. Condition of choroid and retina—the higher grades of myopia are to be feared far less for the error of refraction, which glasses can correct, than for loss of vision due to choroidal and retinal changes for which there is no remedy. 4. Constitutional condition —it is clear that constitutional disease may be a factor in any case of myopia. It may account for the abnormal yielding of the sclera; it certainly often aggravates the morbid changes in the choroid and retina. 5. The evidences relating to heredity—the tendency to myopia is very frequently hereditary. Hereditary myopia, even of high degree, is sometimes of remarkably innocent type. But heredity confers no immunity from pernicious complications. 6. Occupation—prolonged and habitual close work does harm. Excessive close work in early life is often accompanied by rapid increase of refraction; in later life it often aggravates the graver complications. To continue such work in excess and to decline to increase the working distance by glasses is to encourage a pernicious course. In conclusion, the writer insists we should suspect every myopia, especially in youth, of a tendency to increase, until time has proved it to be stationary; to be doubly suspicious in the presence of congestion or atrophy; and to re-examine at frequent intervals, because we can do more by way of prevention than cure.

The *operative treatment of high-grade myopia* still

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(1) British Med. Journal, Oct. 19, 1901.

offers material for discussion. Koster[1] reminds us that Donders with all his influence opposed the removal of the lens, not because he valued the advantages of accommodation for the near-sighted eye, but rather because he valued the aphakic eye less. This was during the preantiseptic period. Von Graefe also opposed it, fearing that even if the operation were a success, intra-ocular hemorrhage, opacities of the vitreous, solutio retinae, and progressive choroidal atrophy would occur more frequently. From Koster's experience he agrees with von Hippel that the refraction remains unchanged, or at most does not increase more than one diopter. He even advises the removal of the lens in cases of progressive myopia with fair chances of useful vision. He advises operation in most cases where the wearing of spectacles is difficult on account of the nature of the patient's occupation and where there is a considerable degree of anisometropia, especially when accompanied by strabismus or when one eye is emmetropic and the other myopic. In Holland Koster does not often meet with cases that require operation on both eyes. He advises the double operation only when ocular movement is good in each eye, when the amount of myopia is nearly equal for both eyes and when monocular vision is insufficient and binocular vision an absolute necessity to the patient.

Truc,[2] encouraged by the simplicity and success of the aspiration of ordinary traumatic cataracts, has employed this method to *remove the lenses in four myopic eyes.* He found that after one or more discissions the traumatic cataract can usually be completely removed. The operation, when done aseptically, has no serious complications and has given him better results than either the simple or the combined methods of extraction. The procedure is to be especially recommended in relatively young subjects with annular or soft nuclear cataracts.

The most effective method of *correcting the various degrees of myopia* is discussed by P. Schreiber.[3] He believes that myopia is progressive between the seventh and fourteenth years and, consequently, he advises the complete

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(1) Weekblad von Geneesk., July 6, 1901.
(2) Clinique Ophtal., November, 1901.
(3) Klin. Monatsblätter für Augenheilkunde, March, 1902.

correction of the myopia if it is over 1.25. Myopia of 0.50 does not call for correction. A myopia greater than 1.25 and up to 6.50 should be fully corrected, because, without the full correction, children, for example, are unable to follow satisfactorily demonstrations at the blackboard. The glasses should be set in spectacle frames and any astigmatism should also be corrected. In making a full correction, a sufficient range of accommodation should be allowed—sufficient, say, to allow an approximation of objects up to 2.5 dm. If this is not possible, the next weaker glass should be chosen. Weakness of the interni is favorably influenced by full correction. In myopes over twenty years of age who have never worn full correction, it is not his rule to make a full correction, because experience has taught that myopia, at this age, is stationary, and also because, in myopia of the higher grades, full correction is not usually tolerated on account of the micropsia and asthenopia which are often produced. From the fortieth year on, presbyopia is always to be considered and, for reading, a weaker concave glass (say from 2.50 to 3 D. weaker than the distant glass) should be employed. When the myopia is less than 3 D., no concave glass is necessary for reading. If the myopia, with full correction, continues to progress, constitutional treatment is in order.

[In progressive myopia children should not only be kept from school but the eyes may with advantage undergo the atropia "rest cure" for two weeks out of every month. A single drop of a 1 per cent solution instilled into each eye daily, after breakfast, is sufficient, if combined with an outdoor life and the constant use of well-fitting smoked lenses.—Ed.]

**Anisometropia.** One of the best papers on the important subject of *anisometropia* yet written is by Alex. Duane.[1] His conclusions are based on an experience of 39 carefully worked out examples of this condition. He believes that in the large majority of cases of anisometropia, even those in which the difference in refraction exceeds 2 D, *the full correction can be applied with success*, provided the patient is warned that it may take him one or two weeks to get accustomed to the glasses, and that during this period he

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(1) Archives of Ophthalmology, November,. 1901.

must use them steadily. 2. In many instances temporary discomfort is produced by the glasses, but in the majority of such cases the discomfort soon disappears, if the glasses are steadily worn. The period of time that it takes a patient to get used to the glasses so that they no longer give discomfort, varies from a few hours to one or, it may be, two weeks. 3. After the patient has become accustomed to the glasses, they are not only worn with ease and satisfaction, but also often relieve important symptoms, which glasses not compensating the anisometropia do not relieve. 4. It is especially important to apply the correction when there is a beginning squint, which is evidently due to the anisometropia. Yet it is in these very cases that we may expect difficulty in the acceptance of the glasses. 5. The causes of temporary or permanent discomfort in using glasses are: *(a)* Either the strength of the glass, *per se.* *(b)* The unequal prismatic action of the unequally strong glasses. *(c)* The presence of a muscular deviation producing diplopia. The glasses in this case by enhancing the distinctness of the double images, force them more upon the patient's attention, and hence give more trouble than when seen without the glass. 6. The statement that glasses correcting anisometropia cause trouble by producing retinal images that are of a different size in the right eye and in the left is probably fallacious. 7. In anisometropia there is a moderate tendency for the right eye to be the more refractive of the two. In Duane's cases, the right eye was the more refractive in 58 per cent, and, counting only the cases of high anisometropia, it was the more refractive in 64 per cent. 8. In anisometropia the proportion of cases in which the right eye is the more ametropic about equals those in which the left eye is the more ametropic. 9. Anisometropia is very frequently conjoined with muscular anomalies, and particularly (41 per cent of author's cases) with divergence (exophoria). In the cases examined, convergent deviations were less than half as frequent as the divergent. 10. In anisometropia of low degree there is no special tendency to the development of hyperphoria. In high anisometropia, hyperphoria is unduly frequent (occurring twice as often as in low anisometropia). 11. The proportion of cases with squint (especially divergent squint) is high, convergent squint being found in

11 per cent, and divergent in 14 per cent of cases. [Exercise, after ordering glasses, of the unequal eyes with the stereoscope, or with Worth's amblyoscope, will be found of considerable value in many cases of anisometropia where the eyes have not, for any reason, enjoyed binocular vision. —Ed.]

## HYGIENE OF THE EYE.

**Visual Economics.** H. V. Würdemann[1] has written (with Magnus of Breslau) a very important work on the *economic value of the eyesight* in various professions and trades. He draws our attention to the fact that the physiologic and earning limitations of central acuteness of vision are not identical. Science calls an individual blind only when perception of light has entirely disappeared, but in actual practice he is blind if the faculty of sight has been weakened to such an extent that the organ of vision cannot be used to earn a living. Now and then unusual demands may be made upon certain organs which may reach to the highest ability. In actual practice we are satisfied with the amount of labor which does not strain the powers. There is hardly any vocation that demands the extreme limit of sight as a condition of success. A great many individuals may be found who have comparatively poor sight but the same earning ability as those with normal eyes. Neither the lowest nor the highest point of visual acuity corresponds with those used in business; the lowest point of the latter is not as low as the lowest laid down by scientists, while the highest point of the functional range that may be regarded as normal must be considered below the highest scientific standard.

Experience has shown that ordinary coarse work, such as that of a farmer or day laborer, does not require more than one-half the normal acuteness as a condition of success, while the skilled mechanic can do all his work with 75 per cent of the scientific standard of normal acuteness of vision. If the laborer's vision should drop to less than 0.05, he would be blind for all working purposes, and the same might be said of the skilled artisan if his vision fall below 0.15. The writer has utilized these four limit values

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(1) Journal Am. Med. Assoc., Feb. 8, 1902.

and has constructed two ranges within which the professional or economic limits lie. One of these ranges has its highest limit 0.75 and its lowest 0.15 (one-seventh); while the other range would be between 0.50 and 0.05 (one-twentieth) of the normal scientific standard for visual acuity. It is not necessary that the maximum and the minimum limit values exist in both eyes. It is sufficient that they be shown in one eye, the other having the lesser acuity, absolutely necessary for professional visual demands. Würdemann places the followers of the different trades and professions in two groups, according to the standards given above. "It is advisable," he says, "to reach some definite agreement as soon as possible, as hitherto there has been a disposition among ophthalmologists to consider the scientific results of the examination of the visual acuity as the basis for the valuation of the conditions arising in practical life. If the estimation of the results of the amount of damage arising from ocular injuries is to be made in a just manner according to actual conditions, this custom must be abandoned.

**Blindness.** Trousseau and Truc,[1] in a report on this subject, regard as blind those who have not sight enough to enable them to work and obtain a living. The authors find that blindness has increased in France but believe this apparent increase due to more exact methods of obtaining data. The increase has been entirely among adults. Geographical location has little to do with the number of cases, this depending more on their social surroundings. The various causes are enumerated: Optic atrophy, glaucoma and myopia retain their former percentage, while purulent conjunctivitis is less frequently a cause. Among the infants of the Paris schools, purulent inflammation of the conjunctiva is still the most frequent cause; this they think is so because prophylaxis is less perfect there than it is in the Provinces. Among adults, optic atrophy is the most frequent, and among the old—glaucoma. They find that at least 35 per cent of blindness is due to avoidable causes, and especially is this true of the purulent forms of inflammation whose prevalence is largely the result of the employment of midwives.

Does an individual who has lost an eye suffer in work-

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(1) La Clinique Ophtalmologique, May 10, 1902.

ing efficiency? Maklahoff[1] shows by an examination of 62 mechanics (mostly weavers and spinners) that 45 earned just as much as the 17 who had both eyes. He makes a report upon 22 workmen, each of whom had lost an eye from injury. Of these 22, 12 had regained their early efficiency and in 4 cases it seemed that their efficiency was increased. In 6 cases the efficiency was less and in 4 absolutely lost. He thinks that a workman with one eye is quite as efficient as the one with two. [This conclusion differs materially from that of Magnus and Würdemann.]

**Artificial Light.** This important subject is discussed by Houdart.[2] He says that our standards of judgment must always be based upon solar illumination in considering the intensity, fixity, regularity, and composition of artificial lights. For certain purposes, as for example, school use, a standard can be obtained, but oftentimes it becomes a matter of taste, depending on the individual and the occupation. The author believes that we are constantly warned against using too strong a light, but until a means of illumination that is more powerful than the sun is obtained, such protestations may be disregarded. He thinks that the primary necessity, aside from intensity, is the avoidance as much as possible of shadows; a result that is partly obtained by using ground globes that multiply the number of luminous points. At present, the electric light alone unites the qualities of regularity, intensity, and conservation of normal colors, with an absence of atmospheric contamination. As with other lights, the eyes must be protected from the direct rays, and as far as possible, the object of application should be alone illuminated. The arc light lacks fixity and is not applicable when prolonged gaze is required; it is well adapted for use in public halls, etc. Gas jets have markedly improved, but the atmospheric contamination can never be obviated. Acetylene gives a bright white light and would be better even than electricity for factory use if it were not for the danger connected with its employment. Petroleum is preferable to lard oil because it offers a whiter flame and emits one-third less noxious products. [After all that has been

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(1) Zeitschrift für Augenheilkunde, June, 1902.
(2) Recueil d'Ophtalmologie, April, 1902.

said in favor of extremely bright lights, like the arc light, high power electric candles, the Welsbach and acetylene lights, they are constant sources of danger if allowed to shine directly or by reflection into the eyes. For near work the soft light of the "student's lamp" (whether the illuminant be gas or oil) cannot be much improved upon. For house lighting an attempt should always be made to imitate *diffused* sunlight.—Ed.]

**Lime Burns.** The disastrous consequences that, as is well known, often follow *lime burns* may be partly averted by prompt and effectual aid which can be applied by others than experts; in other words, by fellow workmen. Such aid should be simple so that it can be readily utilized in all large workshops. For this purpose Hoppe[1] has suggested the use of a soft gelatin tube, about the size of a plum, containing white lanolin mixed with 20 per cent holocain. They are kept in an air-tight box to prevent the growth of bacteria on the gelatin. As soon as the accident occurs the small end or neck of the tube is thrust under the upper lid at the external canthus and pressure is then made upon the body of the tube so that the contents pour out under the lid. The same procedure is carried out with the lower lid. This treatment can be applied by any intelligent workman in the shop, and it should be done at once. As soon as possible afterwards an oculist should be consulted.

## BACTERIOLOGY.

**Action of Toxins.** The rôle played by bacteria and their *toxins in inflammations of the eye* has been little considered in bacteriologic research and it has remained for an American, R. L. Randolph,[2] to fill this gap in an extremely important line of investigation. The essay deserves to be read in its entirety. The author premises, as is well known and frequently demonstrated, that bacteria of all sorts are constantly present in the normal conjunctival sac and that some of these are pathogenic. Moreover, we know that serpent or spreading ulcer of the cornea is the result of infec-

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(1) Centralbl. f. pkt. Augenheilk., February, 1902.
(2) Am. Journal Med. Sciences, November, 1902.

tion by Fraenkel's pneumococcus and probably ought always to be referred to as "pneumococcus ulcer." In the same way the staphylococcus aureus is responsible for some of the disasters that follow cataract extraction—results mostly due to the fact that it is practically impossible to sterilize the conjunctiva. Randolph shows, more decidedly than has been previously demonstrated, that the micrococcus epidermidis albus is often present in the sac and that this organism is mildly pathogenic. So far we can only suspect that trachoma, spring catarrh and phlyctenular conjunctivitis are the result of the growth and multiplication of special bacteria in the external ocular structures. The writer also confirms the generally accepted opinion that "pink eye" is the result of infection by the Koch-Weeks bacillus, gonorrheal ophthalmia by the gonococcus of Neisser and the usual forms of sub-acute and chronic conjunctivitis by the Morax-Axenfeld diplobacillus.

How do these organisms bring about inflammation? Randolph's reply is that they do not act the part of a foreign substance, irritating the conjunctiva, but produce soluble substances (toxins) that in their turn act on the cellular elements of the tissues after the protecting epithelium has been removed either by traumatism or other means. There is difficulty in proving this theory by experiment as a number of bacteria important in eye diseases, especially the Koch-Weeks bacillus, the gonococcus, and the diphtheria bacillus are peculiar to man and do not readily grow on the rabbit's conjunctivæ, the usual organs chosen for such experiments. When they do produce inflammatory changes in the rabbit's eye, what is their *modus operandi?* After a long series of admirably conceived and carefully conducted experiments, Randolph was unable to set up an inflammation by the instillation of pure toxins into the conjunctival sac of rabbits, although the exhibition of the poisons was repeated at short intervals for hours, not only the toxins of the most virulent bacteria but the dead organisms themselves being used. In the course of the investigation the author again reminds us that the streptococcus pyogenes is a not uncommon cause of corneal ulcer and is usually found in the discharges of a purulent dacryocystitis either alone or as a "mixed" infection. A mild form of membranous conjunctivitis in children is the result of the same agent and it might be well always to refer to this condition as streptococcus diphtheria of the conjunctiva. One must not forget, also, that the bacillus coli communis has caused panophthalmitis and other forms of ocular inflammation. Finally, the xerosis bacillus, like the micrococcus epidermidis albus, is productive of mild types of conjunctival disease. Having failed to induce any inflammatory reaction in the rabbit's conjunctiva by simple contact of these dead (culture) bacteria or their toxins the experimenter injected the latter into the conjunctiva. The result was very marked; in every instance characteristic inflammatory changes showed themselves. A third series of experiments, in which the toxins were injected into the anterior chamber, produced undoubted signs of iritis. In both these series control experiments, negative in results, were made with sterile bouillon. Randolph ends this valuable and original study by a bacteriologic investigation of the normal conjunctival sac of the rabbit and finds, as in the human eye, that it acts as the host for numerous bacterial guests, benign and pathogenic. This part of the study is original with him and its importance is considerable when we remember that the eyes of the rabbit are almost invariably chosen as the media for ophthalmic research.

These experiments, then, show the importance of an unbroken epithelial surface in protecting against local and general injuries from the toxins of pathogenic bacteria. The author does not attempt to say to what extent the intact epithelium protects the tissues in a purely mechanical way or whether the epithelial cell resists chemical union with the toxin in the sense of Ehrlich's "side-chain" idea. The fact remains that the primary and essential damage in microbic invasion of the anterior ocular structures is due to the toxins, and where the bacterial bodies destroy the tissues it is a secondary lesion made possible because the soil had been prepared by previous maceration and invasion of the cells by the toxins. The practical conclusion of the paper is that in a large percentage of infectious ocular inflammations some lesion or break in the continuity of the protecting epithelium of the conjunctiva or cornea has occurred, and that without an opportunity for this exposure the presence of the most virulent bacteria and their toxins is harmless. It is probable that the rubbing of the eyes with the fingers is more dangerous, from the standpoint of minute abrasions of the tissues, than because of a possible infection by the poisons themselves. When one eye is infected, say, by the gonococcus, the protection of the second eye is effective as much by preventing slight local abrasions as by exclusion of the infectious bacteria. How important then, is the injunction, to avoid rubbing the eye when a foreign body has blown into it! How easy to inoculate the conjunctiva or cornea with any of the bacterial products that usually bathe the anterior segment of the eye! We may well end this review by referring to the observations of Coppez as a good example of the probable method of infection in the great majority of cases of bacterial invasion. The diphtheritic toxin (for example) acts on the anterior surface of the cornea, but the pavement epithelium, like a wall, offers resistance and usually effective resistance to the assault, but when the latter breaks down rapid disintegration of the tissues follows. Now anything, even the very act of making applications to the eye in the course of treatment—with a medicine dropper, a brush or other agent—or the constant rubbing of the cornea by the false membrane on the upper lid may easily remove a few epithelial cells, and the damage is done.

**The Koch-Weeks Bacillus.** Conjunctivitis from infection by this bacillus is the subject of a paper by E. A. Shumway,[1] based mainly upon a severe epidemic of the disease presenting unusual features, such as marked thickening of the conjunctiva, marginal phlyctenules and occasional ulcer of the cornea. Complete histories of three cases are given accompanied by a report of microscopic examinations of the discharges. Hitherto Shumway had agreed with others that the pneumococcus is uniformly responsible for epidemics in Philadelphia of acute contagious conjunctivitis. His conclusions are as follows: The Koch-Weeks bacillus conjunctivitis is apparently becoming more common in Philadelphia than has been hitherto observed. It may present itself in a particularly severe form and be complicated by phlyctenules and even by corneal ulceration. These cases are especially contagious, and extra precautions

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(1) Phila. Medical Journal, April 26, 1902.

should be taken to prevent their spreading, particularly among school children. As a rule, they are controlled by the use of mild astringent lotions and applications of 2 per cent solution of nitrate of silver. Protargol has not been tried, but equally good results have been obtained by other observers when the solutions used have been of sufficient strength, viz., 10 to 20 per cent. [The Editor suggests, after several months' trial of the agent, the use of *argyrol* in 20 per cent solution for the relief of the symptoms in Koch-Weeks bacillus conjunctivitis and in similar forms of conjunctival infection—particularly after the initial stage has passed. It is non-irritant, reduces the secretion and swelling, lessens the danger of corneal complications, and may be applied once or twice a day. The sac should be irrigated with weak boric or normal salt solution immediately before and fifteen minutes after applying the remedy.]

A rather heated controversy has been carried on by Pes and Bietti regarding *the identity* (or otherwise) *of the Koch-Weeks with the Löffler bacillus.* In a recent article Bietti[1] briefly sums up the results of his investigations. He calls the attention of Dr. Pes to the fact that the latter has never given a satisfactory reply to the evidence thus far brought forward, proving that the bacteria in question are absolutely distinct.

The *bacterium coli* has been found by Axenfeld and others in inflammations of the conjunctiva. Zur Nedden[2] found it in pure cultures from a traumatic ulcer of the cornea and was able to produce ulcerative keratitis in a rabbit by inoculation with a pure culture of the organism in bouillon. From this experimental ulcer he succeeded in recovering the organism and produced the same condition by further inoculation of the second generation.

**The Chalazion Bacillus.** Hala[3] has confirmed fully the results obtained by Deyl in the study of the *etiology of chalazion.* In 12 cases, examined within 3 weeks of their origin, he was successful in obtaining a pure culture of Deyl's *chalazion bacillus,* which he has identified as the xerosis bacillus. Injections of bouillon-suspensions of the culture on blood serum beneath the conjunctiva of rabbits,

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(1) Annali di Ottalmologia, 30, 12, 1902.
(2) Klin. Monatsbl. f. Augenheilk., January, 1902.
(3) Zeitschrift für Augenheilkunde, November, 1901.

produced in nearly every case growth which was histologically identical with chalazia in man. Only rarely could the bacillus be again obtained from the experimentally produced chalazia, although in one case he was able to carry the process through a third generation. He concludes as follows: 1. Chalazion represents, etiologically considered, an infectious bacterial process. 2. The bacilli found constantly and alone in considerable quantity in incipient chalazia, are identical in all their properties with that group of "Coryne" bacteria which Kuschbert-Neisser and Leber have cultivated, and which are called "xerosis bacilli." 3. The so-called xerosis bacilli, which are present in the normal conjunctiva, and especially in its various pathologic conditions, probably penetrate the conjunctiva through rubbing of the eye, and on growing there, produce an acute inflammatory process, which changes into a growth composed of chronic granulation tissue. 4. Various catarrhal affections of the conjunctiva and asthenopia in its different forms predispose to these xerosis bacillus affections. 5. In opposition to Baumgarten's opinion of the absolute a-virulence of the xerosis bacilli, experimental chalazia may be produced in rabbits by the injection of xerosis bacilli, obtained not only from human chalazia but from a variety of other pathologic processes. Consequently chalazion is not a retention cyst produced by occlusion of the duct of the Meibomian glands, and the tumor has none of the characteristics of, nor connection with, tuberculosis.

## THE EYELIDS.

Terson(1) states that *palpebral horns* are more frequent in women, and usually occur after forty years of age. The horns are of variable size, the longest one noted being four centimeters in length, as reported by Shaw. Of the five cases studied by the author, the shortest horn was 5 mm. in length and the longest was 13 mm. One of the cases is of interest because a sister of the patient was affected with melanotic epithelioma of the limbus of the cornea and another sister had a fibromyoma of the uterus. A grandmother of this patient died of uterine cancer and a brother of gastric cancer. The case would therefore probably prove that although horns are growths of a benign character yet they may bear a hereditary affinity to other tumors. It is of interest to note in this connection that recently Bruault has discovered that glycogen is abundant in malignant tumors and is absent or almost so in benign growths. In the cases just cited, glycogen was present in small quantities.

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(1) Clinique Ophtal., March 10, 1902.

The description of a case of *carcinoma of the eyelid* by W. Campbell Posey and Edward A. Shumway[1] is of value chiefly on account of the plastic operation concerned in its surgical treatment. Although the eye was subsequently lost the primary operation was a success. The patient, a female, aged 61 years, had lost the left eye from glaucoma. As shown in the figure the lids of the right eye were almost

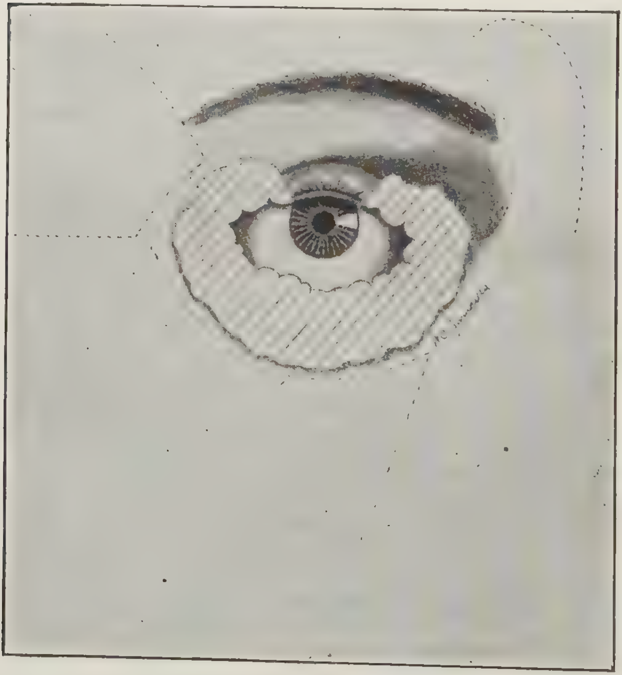

Fig. 4. Carcinoma of Eyelids. Posey and Shumway.—(Phila. Med. Journal.)

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[1] Phila. Med. Journal, July 5, 1902.

entirely destroyed and offered but little protection to the eyeball, which already showed the effects of the irritation to which it was exposed in consequence. The upper lid was much affected, the outer third of its ciliary margin being extensively ulcerated, and the corresponding portion of the inner third also showed signs of breaking down. The cornea was still clear and permitted a glaucomatous excavation in the head of the nerve to be seen with the ophthalmoscope. As a result of the ulceration and the adhesions, the globe was fixed and its rotary power much restricted. The upper lid could be elevated but little, owing to the adhesions at both canthi, so that the patient threw her head back when she wanted to see distinctly. Vision equaled 5/12 and with a +S. 4 D. lens, type 0.50 D. was read from 30 to 40 cm.

An incision was made in the skin the entire length of the lower orbital rim and parallel with it, but far enough below to fall in sound tissue. The ulcerous mass was then grasped firmly with dressing forceps and freed with some difficulty from its attachments, as it was found to have involved the floor of the orbit to a considerable depth, and to have formed very close connections with the sublying tissues. Great care was exercised to avoid wounding the globe, but on account of the extensive dissection required to extirpate the mass, its circulation was greatly interfered with and the bulbar conjunctiva became greatly injected. After the growth in the floor of the orbit had been disposed of, the upper lid was divided by vertical incisions with scissors and the ulcerated tissue at both canthi removed, so that only the central portion of the lid remained. The growth had spread deep into the orbit at the inner canthus, and it was with great difficulty that it was removed from that position on account of profuse hemorrhage. The excision of the ulcerated areas being accomplished, it now became a question as to how the large areas both in the region of the lower and upper lids, which had been denuded by the operation, should be filled in. It was obvious that any attempt to restore the cul-de-sacs would be futile, and that the only procedure which was possible, was to cover in the orbit as well as possible by flaps taken from the surrounding parts of the face. As the skin there was well adapted for transplantation, being full and redundant, the writer hoped to have speedy union follow this transplantation and thought that granulations would soon fill up the orbit from below. A large quadrilateral flap was accordingly obtained from the cheek immediately below the incision which had been made parallel with the lower orbital rim, the vertical lines of the incision being carried

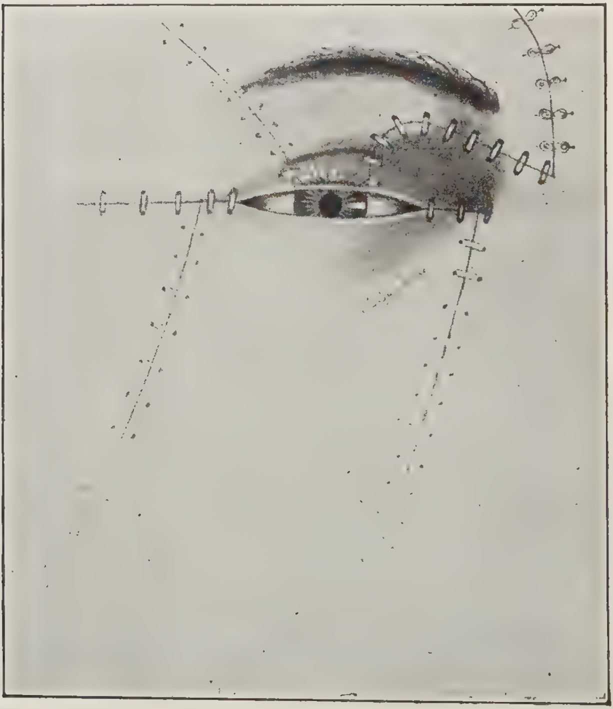

Fig. 5. Posey and Shumway's Operation.—(Phila. Med. Journal.)

below the angle of the mouth. To fill in the gap at the outer canthus, another quadrilateral flap was dissected from the temple, while the inner canthus was covered by a flap taken from above the root of the nose. The lower and the temporal flaps were carefully undermined from the underlying tissues and slid forward into the new position they were to occupy. The flap for the inner canthus, however, was cut free from the surrounding skin and twisted down into position. The three flaps were then stitched together and to the small portion of the upper lid which still remained, in such a manner that the eye and the orbit were perfectly covered and without tension. (Fig. 5.) Better to approximate the wound, and to make firm pressure on the field of operation, and thereby prevent any tendency to bogginess under the large lower flap, two broad bands of rubber adhesive plaster were passed from the angle of the chin diagonally across the face, and fixed over the left eye, and a firm compress bandage was applied over this. The wound was dressed on the third day, and as there were no signs of tension or suppuration, a lighter dressing was applied. Two days later the adhesive strips were removed, and the union of the flaps found to be almost perfect, except at the inner angle of the orbit, where there was some slight superficial suppuration at the points of insertion of several of the stitches. The temperature was normal after the operation, there was no pain and the patient was in the best of spirits. Three days later the stitches were removed and the globe carefully inspected. The cornea was clear, the globe was quite white, and the patient said she could see as well as before the operation.

## CONJUNCTIVA.

**Trachoma.** During the past year the usual (abortive) attempts to penetrate the mystery of the real nature of the infection in *trachoma* have been made. Each observer generally reiterates the belief that it is due to a specific infection and probably to a specific organism, but the great variations in the course and characters of the disease—due to climatic conditions, as de Wecker[1] believes, to racial differences, to environment, and to other causes, leave the question still an open one. W. H. Wilder's[2] admirable study of this affection in Illinois shows that most of the cases come from the southern part of the State. He has prepared a map which bears out this statement, as well as

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(1) Annales d'Oculistique, January, 1902.
(2) Ophthalmic Record, November, 1901.

the fact that it is more common and more virulent in the sparsely populated country districts where habits of cleanliness have never been formed—"where the bath-tub is unknown, while the basin and hand towel are used in common by the whole family." He also comes to the old conclusion, viz., that trachoma is essentially a filth disease and flourishes where personal hygiene is uniformly neglected.

The differential *diagnosis of trachoma* is almost as vague as ever, according to Morax.[1] Neither histologic examinations nor bacteriologic findings throw much light on the subject. The morbid changes accompanying typical trachoma may be, he says, simulated both macroscopically and microscopically, by other forms of conjunctival infection; moreover, the contagious element of the disease may be as great in a case with but slight thickening of the tarsal conjunctiva as it is in a typical one. We must therefore recognize the variability of effects from a single microbic cause and not depend too specifically on the anatomic findings. We should also consider the transmissibility and chronicity of the process. Follicular conjunctivitis, he believes, is not infrequently differentiated from trachoma by a study of its evolution alone. Tubercular and syphilitic conjunctivitides also may closely resemble trachoma anatomically. In such cases, the diagnosis can be made only from other data. Bacteriologic researches have revealed that many of the acute exacerbations occurring in trachoma are really the result of mixed infections. In Egypt, where 90 per cent of the indigent population is infected by trachoma, the acute outbreaks occurring during the months of April and May are the results usually of infection by the Koch-Weeks' bacillus. During July and August, the gonococcus plays a more important rôle, but the Koch-Weeks' bacillus persists. During these outbreaks of acute infectious conjunctivitis trachoma is also easily transmitted and to it have been ascribed the many acute symptoms that are included under the heading of "acute trachoma."

The modern *treatment of trachoma* is sensibly set forth by Catnarovicz.[2] After reviewing the subject in all its phases he advises general cleanliness, good food and air,

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(1) Annales d'Oculistique, March, 1902.
(2) Clinique Ophtal., Sept. 25, 1901.

with irrigation of the conjunctival sacs and lacrimal ducts with benign washes. Should large vascular granulation with abundant secretion be present, he makes use of 1 or 2 per cent solutions of nitrate of silver. If the granulations be small and hard, he employs sulphate of copper. [American patients do not flourish under blue stone applications. Milder means ("lapis divinus" or alum) seem to afford better results.—Ed.] In both conditions he thinks well of cold compresses.

Where expression is permissible, he advises the use of Knapp's roller forceps without previous scarification, followed in accordance with the condition of the case with the employment of sulphate of copper, nitrate of silver, frequent irrigations and cold compresses. Ulcers and even abscesses of the cornea are complications he treats with atropin or eserin as he thinks necessary. Bandages and hot compresses he has found are to be avoided. As a last resort, he believes that jequirity may be employed.

Public education as to the infectiousness of the condition, the establishment of hospitals and wards for the treatment of ophthalmic cases, with special study of the disease by physicians, all are strenuously urged.

**Treatment of Pannus.** The use of *the infusion of jequirity* for the removal of *pannus* has fallen into abeyance mainly because of the variable dosage and its dangerous and uncertain action. Römer[1] has sought to remedy these defects in an otherwise valuable agent by the careful manufacture, from the *abrus precatorius* of a definite compound which he has called *jequiritol.* He believes this to be a more reliable preparation than *abrin*, the infusion or the powdered seeds. It is made in four different strengths. The treatment begins by the instillation of a single drop of No. 1 on the first day, the dose being gradually increased in amount and strength until a well marked jequirity inflammation is set up. Should the inflammatory reaction at any time be too severe it is controlled by dropping into the eye a small quantity of jequiritol serum (prepared on the principle of Behring's serum) repeated as often as necessary or, if the reaction be excessive, by its hypodermic use. Both remedies are prepared and sold in a box—with full directions for use—by E. Merck. [The Editor's recent ex-

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(1) Archiv f. Ophthalmologie, 52, 1, 1901.

perience with this remedy warrants his recommending it to his colleagues.]

Lapersonne[1] agrees with Römer in reference to the anatomic findings after applications of *jequirity; i. e.,* enormous leucocytic infiltration with the transudation of serofibrinous fluid. With these, he says, there is a true leucocytic thrombosis of the fine veins of the conjunctiva and cornea; the latter condition explaining the rapid disappearance of the pannus. He has found Merck's carbolized solution of abrin to be unreliable and prefers a one-to-twenty infusion of the jequirity which he rubs upon the conjunctiva with a cotton applicator. He refers to the antiabrin serum, but states that it has no clinical application since it will control the effect of the jequirity only when it is applied within 48 hours after the employment of the drug. It is only after this period that the menacing effects usually develop.

The *treatment of pannus by pericorneal electrolysis* is advocated by Lor,[2] who says there are two varieties of this condition. One of these is accompanied by a fully developed trachoma; in the other the cicatricial stage of the conjunctival disease has been reached and the pannus remains. Lor advises the treatment at the same time of both the lesions of the first class. The patient is anesthetized and the conjunctival granulations are destroyed by unipolar electrolysis. The cornea is treated as follows: The positive pole being applied to the corresponding cheek, a 2 to 3ma. current is applied, by means of a de Wecker electrolysis brush, to the whole length of the corneal limbus. By this means, the pericorneal structures are destroyed down to the episclera in a zone of 3 to 4 mm. in width. The brush is then lightly applied over the whole cornea some two or three times until the vessels in the superficial corneal layers are reached. After irrigation and the introduction of a little vaselin between the lids, a simple dressing is applied. The after-results of the operation are undisturbing, the patient being able to open his eyelids on the following day. If the palpebral conjunctiva has been treated, this should be rubbed with a tampon of cotton moistened in a 1-4000 solution of bichlorid of mercury

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(1) Clinique Ophtal., Dec. 10, 1901.
(2) Annales d'Oculistique, March, 1902.

at the end of a few days. The writer prefers electrolysis to jequirity in such cases, as he has found it more certain, more easily graduated and better controlled on its application.

**Pterygium.** Panas[1] describes the *alterations in gerontoxon, pterygium, pinguecula and chemical keratitis.* The first is, he says, the result of a fatty degeneration of the corneal corpuscles of the stroma, and later of the stroma itself. The author believes corneal ulceration has nothing to do with the formation of pterygia, which consist essentially of a hypertrophic epithelial layer overlying a tissue that contains areas of hyaline degeneration with numerous elastic fibers. He removes them by ablation, curettement and cauterization of the entire corneo-scleral bed, followed by conjunctival suture.

Pinguecula, he thinks, is an involution change and belongs therefore to the same class as gerontoxon and pterygium, into the latter of which it not infrequently develops. It consists of hyaline degenerative changes involving the conjunctival stroma, the submucous tissue, and even the episclera.

Chemical keratitis, he states, is a dystrophy which appears in leucomatous corneæ, although it may be found in transparent corneæ which are the seat of chronic irritation. This affection is characterized by the deposition in the cornel epithelium, Bowman's membrane and the superficial corneal stroma of numerous yellowish or whitish points resembling a precipitate—whence the name. From the staining reactions, he has found that this deposit is apparently hyaline in nature. It may be removed by scraping, followed by the application of hot compresses.

**Diphtheria.** *Diphtheria of the conjunctiva* is the subject of a recent report by Sidney Stephenson.[2] He communicated notes of 43 cases where the diphtheria bacillus was found. The infection was "pure" in 13.93 per cent and "mixed" in 36.04 per cent of the cases. As regards treatment, Stephenson advised liberal and early doses of antitoxin, with 1:5,000 solution of corrosive sublimate applied to the conjunctiva by means of a small spray. He concluded that "croupous" and "diphtherial" conjunctivi-

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(1) Archives d'Ophtalmologie, May, 1902.
(2) Transactions of the Ophthal. Soc. United Kingdom, March, 1902.

tis are clinically and bacteriologically one and the same disorder.

On the same occasion W. H. H. Jessop read notes of 13 cases of *membranous conjunctivitis.* All had adherent membrane which left a raw surface when stripped off. Eight showed the Klebs-Loeffler bacillus, giving the characteristic reactions. From a culture of three of the cases guinea-pigs were inoculated, causing death in 48 hours with necrosis of tissue at the seat of inoculation and inflamed suprarenals. There was also enlargement of the neighboring lymphatic glands. The temperature was over 100°, albumin was present in the urine, but only one case had membrane in the fauces. In no case was there paralysis or paresis of the soft palate or absence of knee-jerk. The other five cases were tested several times for the Klebs-Loeffler bacillus, but without success. Two had streptococcus pyogenes, two had staphylococcus albus, and one staphylococcus aureus; none had albuminuria, only two had raised temperature, two had enlarged glands, but none had membrane of the fauces. *The diagnosis between diphtherial and non-diphtherial membranous conjunctivitis could only be made bacteriologically.* In these cases the clinical evidences of albuminuria, raised temperature, enlarged glands and signs of general diphtheria were a great aid in diagnosis. It was thus proved that all cases of membranous conjunctivitis are not diphtherial and that the type of severe diphtherial conjunctivitis mentioned in textbooks is rarely seen. The term "membranous conjunctivitis," which is convenient, must be enlarged to include cases due to diphtheria and other organisms.

**Gonorrhea.** A practical paper on the *treatment by picric acid of gonorrheal conjunctivitis* in the new-born is published by Francesco Re.[1] Fage[2] used this remedy as an ointment in blepharitis, but no one, hitherto, has thought of its application to the eye in solution. As is well known all sorts of means have been employed to combat this most grave form of conjunctivitis, while the remedies used have been continually modified and substituted for one another, yet the frequent bad results of the disease have shown their insufficiency and have served only to draw

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(1) Archivio di Ottalmologia, Fasc 1-2, 1902.
(2) Ophthalmologische Klinik, June 25, 1901.

attention to the gravity and violence of this variety of ophthalmia. Seven cases of blenorrhagic conjunctivitis resulting from the gonococcus, and many other muco-purulent forms which presented themselves at his clinic, were cured by picric acid. The use of this drug has given him such good results that he regards it as the only method which is entirely free from danger to the cornea and which shows an efficiency superior to all the other methods used for this form of disease. Although picric acid alone conquers the most severe forms of blenorrhagic conjunctivitis, yet Kalt's fluid should also be made use of to irrigate the conjunctival sac, as the best solution for diminishing the secretion of the conjunctiva. The writer advises us to omit the sublimate, or to use only a very weak solution. He is accustomed to prescribe as follows:

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| Permanganate of potash | 3.0 |
| Corrosive sublimate | 0.5 |
| Distilled water | 1000.0 |

When there is much chemosis, or if much irritation follows the use of sublimate, the permanganate of potash should be used alone. If the disease rapidly subsides, or when slight at first, Fage substitutes for this solution one of boric acid 2 per cent. The picric acid solution is as follows:

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| Acid picric | 0.20 |
| Aqua dest. | |
| Glycerin | aa 10.0 |

This solution may be used in all forms of the disease either for painting the lids or for instillation. The treatment is to be repeated several times a day. Re prefers painting to instillation, because it is more efficient and the solution comes into more direct contact with the tissue of the conjunctiva. When there is corneal ulceration the acid is not contraindicated because, on account of its antiseptic properties, it accelerates and especially favors cure and cicatrization of the ulcer itself.

## LACRIMAL APPARATUS.

A patient presenting a *supernumerary canaliculus* consulted S. J. Schoute.[1] She was a teacher, aged 20, and suffered from a chronic conjunctivitis. Injection with Anel's syringe resulted in a flow of fluid from an opening situated half way behind the nasal part of the canaliculus. In size it was equal to that of a No. 2 probe which was introduced into the opening and the syringe used in the normal punctum. The fluid escaped into the nose and some of it through the superior punctum. This demonstrated that it did not correspond to either the superior or inferior punctum. As there was no dacryocystitis or other trouble that could account for this condition, the diagnosis must be that mentioned above. It could be explained on the ground that two secondary epithelium knobs instead of one grew out of the primary tube. The patient was hyperopic to the extent of one diopter, the correction of which gave her much relief. Three cauterizations of the opening failed to close it.

[A short time ago the Editor saw a man of 35, in consultation with T. A. Woodruff, for a simple, acute conjunctivitis. He had a well marked double, lower canaliculus on the left side. Both canals communicated independently with the sac, the one being superimposed on the other. One imperfectly formed punctum was placed 3 mm. nearer the inner canthus than the other, which was normal. There never had been any lacrimal symptoms, and the patient was not aware of the existence of the anomaly.]

Antonelli[2] has found that bougies of gelatin-protargol are effective in affections of the *lacrimal passages*. For their use a more or less complete section of the canaliculus is indispensable, and a stricturotomy is often useful. Gelatin is the preferable excipient because of its strength, its flexibility, and its solubility. The sounds ordinarily employed by him are equal in size to No. 4 caliber. They are introduced after the withdrawal of a No. 5 or 6 metallic sound. He has found that the results obtained by these sounds are undoubtedly better than those secured by in-

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(1) Weekblad van Geneesk., July, 1901.
(2) Annales d'Oculistique, October, 1901.

jections of protargol or other substances. He believes that this is due to the fact that there is a prolonged contact and some peculiar diffusibility of the organic salt of silver. He has employed sounds containing even 50 per cent of protargol and has always found that they are well borne.

## CORNEA.

**Ulcer.** Without advancing anything new Baudry[1] has written a paper on *serpiginous or spreading ulcer of the cornea* of considerable value to the general student. He describes their origin from infected wounds—often insignificant ones, such as abrasions by the finger-nail, scratches from stiff linen, wounds from flying splinters of stone, wood, metal, cinders, etc. Occasionally the infection arises from the abnormal secretions of neighboring parts. They may also occur from the acute infectious diseases, like variola, and from systemic depression. Basse claims that the pneumococcus is the only pathogenic microbe. Uhthoff and Axenfeld, in 34 cases, found the pneumococcus in pure culture 25 times; associated with the staphylococcus in 8 instances. The author enumerates the symptoms of the disease and states that although hypopyon generally arises from the infiltrated cornea, a true endoinfection and iridociliary origin is possible. Bacteriologic examination should always be made, but the findings should not be considered as an infallible guide for treatment.

The patient must be warned of many possible complications, of which the most important are panophthalmitis, luxation and expulsion of the crystalline lens, intraocular hemorrhage, and later, adherent leucoma and corneal staphyloma. *Treatment* must be energetic and should have for its main object the destruction of the primary forms of infection. In recent cases with moderate inflammatory symptoms and severe hypopyon, the eye and surrounding parts should be thoroughly cleansed. The complications should be treated and the ulcers touched with a saturated solution of methyl blue or violet, or with tincture of iodin. Frequent irrigation with weak silver or bichlorid of mercury solutions may be tried. In order to reach the

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(1) Le Nord Médical, April and May, 1902.

deeper parts, subconjunctival injections of cyanid of mercury may be given.. Atropin should be instilled four or five times a day, and a light dressing of sterile gauze should be applied. Hot douches and compresses are often serviceable. For pain, phenacetin or sulphonal are recommended. The general condition must be improved by the use of tonics, purgatives, etc. In advanced cases with large hypopyon and increased tension, curetting of the ulcer and burning with the galvano-cautery or with a heated strabismus hook should be done under cocain. If no improvement follows in a few days paracentesis corneæ is required. If the ulcer be peripheral use eserin; if central instil atropin.

Panas[1] divides *infective keratitis-ulcer* into three classes. The first includes spreading ulcer with typical hypopyon; second, ulcer with atypical hypopyon; third, marginal, creeping ulcer, rarely accompanied by hypopyon. He reports one pronounced example of each class. Under treatment with methyl violet, iodoform ointment, hot compresses and atropin, good results were obtained in all. The observations of Uhthoff and Axenfeld demonstrate the presence of the diplococcus pneumoniæ, either alone or associated with other bacteria, in the majority of the cases. These observers say that the membrane of Descemet is perforated almost always late, and that the hypopyon is free from bacteria until after such perforation has occurred.

The following indications for *treatment* are given: First, sterilize the colonies of pathogenic microbes which have invaded the corneal parenchyma; second, remove the hypopyon; and, third, re-establish the pupillary field, which is habitually obstructed by plastic products and false membranes.

In early and in mild cases the first two indications are fulfilled by the use of 1 to 20,000 of biniodid of mercury, of 1 to 10,000 of bichlorid of mercury or of 1 to 5,000 of cyanid of mercury, followed by the instillation of two or three drops of a 1 to 500 solution of methyl violet. At the same time an iodoform pomade may be introduced into the cul-de-sac. Hot compresses are also valuable adjuvants. If these measures fail, the ulcer may be burnt by the actual cautery and the hypopyon evacuated by means of a free peripheral corneal incision. Local applications of tincture

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(1) Archives d'Ophtalmologie, June, 1902.

of iodin are highly recommended by some authors. Römer claims that beneficial results have followed the experimental and clinical use of antipneumococcic serum injected both subconjunctivally and hypodermically.

[The Editor believes that when other methods fail to cure serpiginous ulcer with hypopyon the Saemisch section should not be employed, but Haab's iodoform discs introduced into the anterior chamber through a *peripheral* incision in the cornea. This plan will be found free from many objections to the old form of section; it permits of better drainage of the anterior chamber and allows of its antiseptic treatment.]

In the *treatment of hypopyon keratitis,* Eduard Zirm[1] uses, in conjunction with moist heat, atropia and the electro-cautery, no bandages, but a wire-gauze cataract mask (as less likely to confine the discharges), and allows his patients to go about. He believes that rest in bed has a tendency to interfere with the metabolism of the body in general. Every two or three hours sublimate vaselin (0,01:50) is rubbed in the conjunctival sac instead of irrigating the conjunctiva with a sublimate solution as formerly. Dusting with iodoform has been abandoned and instead a small quantity of xeroform powder [Airol is probably still better.—Ed.] is dusted over the ulcer. Through these measures he has usually cured his patient and rarely has he found it necessary to resort to the Saemisch incision, which he regards as a more or less risky procedure. He claims for this treatment, comparative freedom from pain, rapid cessation of the progress of the ulcer and as a result the scar which is left is rarely a large one. We rarely see anterior synechiæ as we do after making the Saemisch incision. In many of Zirm's cases good vision was obtained. Failure occurred in only three cases and in these three, other factors were at work.

H. Herbert[2] is in favor of attacking the cause of the high tension in *hypopyon ulcer* with as much atropin as the patient can stand, at the same time relieving that symptom temporarily with the knife. That atropin alone may give relief in some of these cases is certain. He cites a case so relieved and adds that when the cautery has

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(1) Centralblatt für pkt. Augenheilkunde, March, 1902.
(2) Ophthalmic Review, November, 1901.

to be used plus tension is reduced by puncture, generally crucial, through the base of the ulcer. Otherwise the paracentesis usually consists in a small subconjunctival sclerotomy. It is recognized that paracentesis is simply to relieve tension, and not to get rid of the pus. In other respects the lines of treatment are orthodox. Almost absolute reliance is placed on the galvanic cautery in early ulcus serpens.

*Cautery of corneal ulcer by carbolic acid* is advocated by Samuel Theobold.[1] The Editor has employed this well-known remedy for many years and cordially endorses the recommendations of the writer, particularly its use as a substitute for the electro- or other form of actual cautery in simple, solitary ulcer and in the early stage of spreading ulcer. The scar produced by phenol [the Editor prefers a 90 per cent solution in glycerin] is less likely to be permanent than with the actual cautery and its application is easier and always to hand. Theobold says, "that the application of carbolic acid to a corneal ulcer *is* a simpler and safer procedure than its cauterization by the galvano- or thermo-cautery goes without saying. But what of its efficacy? I am not prepared to assert that it will accomplish in every case what the cautery will do, or that it should wholly supplant the latter; but I believe that, in many cases in which it is usual to employ the cautery, carbolic acid may be substituted with advantage, and that in most cases it is judicious, at least, to make trial of it before resorting to thermal cauterization.

"In applying pure carbolic acid to the cornea, it is, of course, important to limit its action carefully to the affected part. To facilitate this, the eye should be anesthetized by cocain, which renders the procedure entirely painless. I have found it convenient to make the application by means of a pointed toothpick, to prevent its spreading over healthy portions of the cornea. To the surface of the ulcer the acid should be thoroughly applied by a gentle rubbing movement, which is, in effect, a sort of curettage."

Fuchs[2] has written a paper on *atheromatous ulcer of the cornea.* It is well known that in thick corneal scars,

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(1) Am. Journal Medical Sciences, June, 1902.
(2) Archiv für Ophthalmologie, 53, 1, 1901.

as well as in staphylomatous conditions of the cornea, we often have regressive metamorphoses chiefly consisting in the formation of hyaline masses in the cornea and in the deposit of lime salts in the same locality. Sometimes we find in these scars ulcers, which are thickly coated with pus and on the floor of which are small calcareous particles lying loose. These ulcers have the peculiarity of often extending into the interior of the eye and causing panophthalmitis. In such a condition there is a necrosis of the badly nourished scar tissue of the cornea. This necrosis is sometimes found in the superficial layers and, again, may affect the true substance of the cornea. The necrosis is due to the entrance of bacteria, which entrance is favored by the diseased condition of the epithelium. The necrotic portions are thrown off as sequestra and find their way into the interior of the eye. This sort of ulcer differs from an ordinary ulcer in that it is not primarily an infiltrate but a necrosis. It somewhat resembles the serpent ulcer, but differs from the latter in that the necrosis goes no farther than is necessary for the sequestration of a certain portion of the corneal tissue.

In cases of *adherent leucoma,* with thinning of the cornea and the formation of staphyloma, Sachs[1] suggests trephining of the central part of the cornea with von Hippel's trephine (diameter 2 or 3 mm.), release of the iris from the edges of the wound and from the posterior surface of the trephined disc and replacement of the disc. He has used the method in several cases and believes its success is due to the permanent lowering of the intraocular pressure, as a consequence of the release of the synechiæ, and to the flattening of the cornea which results from the scar tissue.

*Nodular clouding* of the cornea, first described by Groenouw, is the subject of a paper by Fuchs.[2] In the cornea appear small, round, discrete opacities. The larger ones have a diameter of 0.25 mm. and between them lie dust-like points. The changes occupy usually the central parts of the cornea, leaving the periphery more or less clear. The large points push up the corneal tissue to a slight extent and cause, in this way, a slight curve in the corneal surface.

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(1) Zeitschrift für Augenheilk., January, 1902.
(2) Archiv für Ophthalmologie, Bd. 53, 3, 1902.

These opacities exist without inflammatory symptoms, and they may remain unchanged for years. It is certainly a very rare affection, for Fuchs has observed only 8 cases in 20,000 new patients. These cases the author describes in detail. His description does not differ materially from that given by Groenouw. The etiology of the disease is very obscure. In the anatomic examination which Fuchs had an opportunity of making he found no evidences of inflammation, but, rather, of a degeneration which, in his opinion, is the expression of some general disturbance in the nutrition of the cornea, the exact nature of which is not known.

**Lime Burns.** When quicklime or other caustic lime salt falls into the eye a calcic albuminate is formed, which has hitherto been regarded as insoluble. After a number of experiments H. Guillery[1] believes he has found a solvent in *chlorid of ammonium*, which he employed successfully in 2 to 20 per cent solutions by means of eyebaths applied for one-half or three-fourths of an hour daily, at first on the eyes of oxen, then on living rabbits whose corneæ had been cauterized with hydrate of calcium, and finally on a man with an opacity due to lime of a year's standing. For general use he advises 2 per cent solutions, which are not irritating. His conclusion is that the solution of albuminate of calcium in the living human eye is possible and thus a new field for ocular therapeutics has been gained.

## THE LENS. CATARACT.

**Cataract Extraction.** The old, old question as to when and how *senile cataract* shall be most advantageously removed is discussed by M. Bondi.[2] In every case of senile cataract there are at least two questions to be answered. Is the cataract a simple uncomplicated one, *i. e.,* after the removal of the opaque lens will the eye, which was blind till the present, regain the power of vision? Has the time come for the operation, *i. e.*, is the cataract ripe?

Regarding the first question, we speak of a simple uncomplicated cataract as one where the affected eye with an

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(1) Archiv f. Augenheilk., 44, 1902.
(2) Wiener medicin. Presse, July 28, 1901.

absolutely opaque lens is able to recognize and properly to localize the light of a candle in a dark room at the distance of 6 meters. Besides this it is necessary there should be no infection of the conjunctiva and lacrimal duct, and no affection of the cornea and iris. Examination of the interior of the second eye he considers a very important point. As regards the second question, most of the handbooks consider the cataract ripe or unripe according to its anatomic condition, the author only when the power of vision in both eyes is diminished so that the patient can no longer continue his regular occupation. He therefore does not consider a one-sided cataract, though it be anatomically ripe, as fit for operation so long as the other eye possesses good vision. He gives the following reason for this assertion. The eye with aphakia (without a lens) has no power of fixation in central vision, and we must therefore place a strong convex lens in front of this eye and a plain glass in front of the other eye. Such a difference between the two glasses the patient could not stand, and he would in that case use only the good eye. Concerning the enlargement of the field of vision, this in most cases is not of much practical value.

In cases where the other eye is also affected with incipient cataract, the power of vision of the good eye is to be considered in performing an operation on the eye with an anatomically ripe cataract. Only when the power of vision of the good eye is diminished to less than one-third should the cataract of the other eye be considered as operable. On the other hand, if the vision of the good eye has decreased to one-third, he operates on the other eye even though the cataract be not absolutely opaque or anatomically ripe.

Pope, of Madras, India, has had an immense experience in cataract extraction and in the last ten years has operated upon 12,000 cases. In the corticonuclear form his successes ranged from 91 to 92 per cent and with hard cataract he had 92 per cent of successes. The cases were generally operated upon early Saturday morning and most of them left the hospital the following Thursday, though they were kept under close observation for five days longer. Three days before the operation atropin is dropped in and a bandage applied. The next day the eye is irrigated with a boric acid solution, and this is repeated the following day and also the day of the operation, when the eyelids and brows are washed. The instruments, with the exception of the cataract knife, are boiled in a carbolic acid solution and then placed in a cold carbolic acid solution. The cutting instruments are kept in absolute alcohol. The eye is anesthetized with a 4-6 per cent solution of holocain. After the introduction of the speculum the eye is flushed with a 1:100 solution of carbolic acid. The next step consists in piercing the anterior capsule, which is done by introducing a Bowman needle through the scleral border. The corneal section is then made above, including more than a third of the cornea, and a conjunctival flap is always made. Simple extraction is the operation which is usually performed. After the operation any blood which may be present is cleared away, a few drops of glycerin solution (5 per cent) are dropped into the eye and iodoform is dusted over the surface of the eyeball. Antiseptic cotton, upon which white vaselin is spread, is then applied over the lids and iodoform dusted over the whole. Both eyes are closed. The bandage is changed the next day and removed for good on the fourth day. In 25 cases no bandage was used and with no bad results.

Apparently de Wecker[1] advises the *abandonment of dressings after cataract extraction.* He declares that these are badly borne by many patients, particularly by those who are suffering from catarrhal and dacryocystic troubles. In two of the latter the author was obliged to operate for cataract and obtained good results, the only dressing used being a narrow band that was applied vertically over the closed lids and retained in position by some collodion on each end—on the cheek and forehead. He believes this dressing preferable, since it acts as a reminder to the patient. He employs repeated instillations of a sterile eserin solution, thus reducing any tendency to iris prolapse and to glaucomatous changes.

**Ocular Changes After Cataract Extraction.** An interesting paper on the conditions discovered in eyes (eight in number) removed after *cataract extraction* is presented by Hocquard.[2] He particularly examined the cor-

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(1) Archives d'Ophtalmologie, June, 1902.
(2) Annales d'Oculistique, November, 1901.

neal wound and finds that the incision which at the time of operation seemed to lie at the limbus was really situated in the corneal tissue 2 mm. anterior to the ciliary tendon at a position corresponding with the membrane of Descemet and 1 mm. from the anterior epithelial layer. This apparent error he says, was due to the encroachment of the epithelium of the conjunctiva upon the cornea. The incisions did not lie in one plane, but they were arched, angulated, or irregular. He says that immediately after the incision, the corneal lacunæ collapse and both corneal surfaces roll toward one another. The incurving of the anterior epithelial layer is apparently due, he believes, to the expansion and the sliding of its cells, and often amounts to a degree equalling one-fifth of the thickness of the cornea. Beneath this layer, the corneal lacunæ secrete a fibrinous fluid which provisionally unites the wound margins. The superficial corneal layers then unite firmly by means of cellular diapedesis, new vessel formation, and true organization. The deeper layers unite by the retraction and the organization of the primal fibrinous exudate which later reacts to stains similarly with the corneal lamellæ proper. Descemet's membrane agglutinates not end to end, but in an overlapping manner and is held in this position by a fibrinous exudate.

In an eye that had been removed 36 hours after operation the union of the flap was firm, although that of the more deeply seated corneal layers was still feeble. This anatomic fact, he believes, is in favor of the conjunctival flap. In an eye that had been removed eleven days after operation, the union was firm but inflammatory signs with enlargement of the corneal lacunæ and of the fixed corneal cells were still marked. This slow cicatrization, he believes, probably permits the adjustment of the cornea with consequent diminution or compensation of the marked astigmatism that is the necessary result of such a section.

**Secondary Cataract.** *In operating for secondary cataract* Pflueger[1] believes that risks arise from the following sources: Primary infection of the wound; secondary infection alone, the vitreous thread reaching to the cornea; inflammatory reaction from operative manipulation; pathologic reaction of the vitreous humor producing fibrillary

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(1) La Clinique Ophtalmologique, May 25, 1902.

degeneration with retinal detachment or the formation of opacities in the anterior portion of the vitreous. The author concludes that in all operations for secondary cataract it is necessary to avoid as much as possible the loss of aqueous humor and thus more surely prevent the incarceration and loss of vitreous. To accomplish this purpose, the various operative instruments should be introduced through the sclera and not through the cornea or even through the limbus. The operation of de Wecker with a scissor-forceps is the best method for thick and strongly adherent secondary cataracts if suitable instruments are devised to prevent the loss of aqueous humor. In all procedures a double bladed harpoon is efficient, particularly when loss of aqueous seems inevitable.

Kuhnt's method of *discission of secondary* cataract is commended by H. Wokenius[1] as the result of observing 216 operations in the Königsberg clinic. He first points out the dangers and disadvantages of other methods and regards Kuhnt's as absolutely safe. That operator has devised a special knife for this operation. According to Kuhnt, the capsular shreds should always be separated in a perpendicular manner, for in this manner we avoid penetrating, to any extent, the corpus vitreum and no traction is made upon the ciliary region. Perfect artificial light should be used for illumination. The operation is performed in the following way. The eye is first prepared and atropinized. A careful inspection is then made to determine where the capsular membrane should be incised. The knife is passed into the conjunctiva from 3 to 4 mm. from the limbus, on through the sclera and into the periphery of the anterior chamber. The knife is always kept parallel to the plane of the iris and is pushed into the pupillary opening and right into the capsular membrane. A light sawing motion is then made, extending from the pupillary border of one side to that of the opposite side. The knife is then withdrawn through the same opening. Generally speaking, one cut is sufficient, and it should be from 7 to 9 mm. long. The reaction amounts to practically nothing. It is almost impossible (if the operation is properly done) to wound the corpus vitreum except in the most superficial layers, and we never see the harmful

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(1) Zeitschrift für Augenheilkunde, April, 1902.

striæ in the vitreous so frequently seen after secondary operations for cataract. Infection never occurred and, at the same time, vision was never made any worse—a thing which we cannot always say of other operations. On the contrary, there was marked improvement in vision in most of the cases. Glaucomatous attacks were never observed.

**Reclination.** Sclero-or Keratonyxis *(dislocation of lens into vitreous)* should be performed, according to G. F. Suker,[1] and is justifiable in the insane, the epileptic, hemophilitic, cases with a tremulous iris or fluid vitreous but without chorioditis or retinitis, cases with incurable dacriocystoblenorrhea or conjunctivitis, extreme old age with its attendant infirmities, cases with incurable bronchitis and cough, cases in which one eye has been lost by suppuration and indications point strongly to the same fate if the other lens is extracted, in shrunken and secondary cataract—*i. e.,* secondary to some inflammatory reaction and in partial posterior dislocations with tremulous iris.

As a commentary on Suker's paper is a report by Hirschberg[2] of his operation by *reclination* on an idiot, aged 36, blind for six months with double cataract. Narcosis was not admissible, on account of a severe valvular disease of the heart and extraction was impossible on account of the unruly behavior of the patient, and discission was dangerous at that age. The lens, however, proved not sufficiently hard during the operation, so that the needle, introduced through the sclera, 4 mm. from the sclero-corneal junction, somewhat below the horizontal meridian, cut a sector of about one-fifth of the lens inward and upward, instead of reclining it. Uncomplicated recovery under atropin and bandage. After three months the sector fell into the anterior chamber as the lens grew smaller on the side, so that the patient gained good vision, sufficient to walk about.

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(1) Am. Journal of Ophthalmology, June, 1902.
(2) Deutsche med. Wochenschrift, 13, 1902.

## UVEAL TRACT.

W. Stock,[1] by examination of eyes from which the pigment has been removed, has been able to demonstrate satisfactorily the existence of a *muscular dilator iridis,* in dogs, cats, oxen and horses. In these animals it is but slightly developed, whereas in the otter it is relatively much larger, composing fully one-half of the thickness of the iris. The cells are arranged in parallel bundles; they possess the long, rod-like nuclei which are characteristic of involuntary muscle tissue and stain in the same way. Stock's investigations are an independent corroboration of the work of Hans Virchow upon this animal.

**Iritis.** H. Kirchner[2] has prescribed *aspirin* with happy results in acute iritis. Cases which failed to yield to salicylate of soda and salol were markedly benefited by the administration of aspirin. The value of aspirin was seen not only in inflammations of rheumatic origin but in iridocyclitis from a variety of causes. The pain in this class of cases seems to vanish as if by magic under the influence of aspirin. Cases of scleritis and abducens paralysis were apparently uninfluenced. The author reports a case of iritis serosa where the pain disappeared and the exudates were absorbed under the administration of aspirin. Supraorbital neuralgia was promptly relieved, particularly the very acute cases. Headaches of obscure origin were dissipated by aspirin so also headaches where the cause was known, but which had failed to yield to the usual remedies. Generally speaking 15 grains were employed at a dose, and this dose was sufficient to relieve the trouble. More than 30 grains were never necessary.

**Tuberculosis.** The *treatment of tuberculosis* of the iris, cornea and choroid by the injection of air into the anterior chamber is a novel expedient recommended by Koster.[3] He first empties the chamber of some of its contents and then forces air into it with a hypodermic syringe. Four injections are usually sufficient for a cure. [This procedure reminds one of the successful treatment of abdom-

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(1) Klin. Monatsbl. für Augenheilk., January, 1902.
(2) Ophthalmolog. Klinik, 18, 1901.
(3) Klinische Monatsblätter für Augenheilk., April, 1902.

inal tuberculosis by a simple laparotomy with exposure of the peritoneal cavity to the outside air. Perhaps the *modus curandi* is the same in each instance.—Ed.]

Haab[1] has observed *the subsidence of iris tubercles* after the introduction of his sterilized iodoform *disks* into the anterior chamber. This favorable action of iodoform lasted until it was absorbed—a few weeks. Then a new eruption developed. Vision was not impaired in two cases under such treatment during four and a half months. Haab has, as we know, observed very favorable results from introduction of iodoform *rods* into the vitreous, in threatening or active traumatic inflammations. It is borne very well by the vitreous. Iodoform, of course, does not heal all intraocular infections, but it does heal many of those which have not spread too far or have not injured the tissues of the eye too much.

**Descemetitis.** H. D. Bruns[2] believes that one should not use the term *"serous iritis,"* any more than one would refer to a serous cyclitis or choroiditis. He thinks that descemetitis, upon which the diagnosis of serous iritis was long made to rest, is a symptom which sometimes appears as an accompaniment of a focus of acute inflammation in the iris, ciliary body, or choroid. It may also appear in cases of uveal disease so slight and evanescent that we are unable to determine in what portion of the membrane the focus may be situated; in such cases we cannot make our diagnosis more precise than is indicated by the term incipient uveitis. Descemetitis is also seen in certain cases of subacute or chronic uveitis, in which it is impossible to determine the precise site of the focus, but such inability by no means justifies the diagnosis of simple, subacute, or chronic cyclitis. More exact and extended observation will, probably, show descemetitis to be most frequently the principal symptom of the outbreak of an acute plastic (exudative) choroiditis, this being overlooked because too few cases of iritis or cyclitis are subjected to careful ophthalmoscopic examination after recovery and the complete disappearance of vitreous opacities. Many cases, not to be distinguished clinically from such cases of acute plastic choroiditis, show upon examination with the

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(1) Correspondenz Blätter für schweizer Aerzte, No. 8, 1902.
(2) Archives of Ophthalmology, November, 1901.

ophthalmoscope after complete recovery and clearing of the vitreous, no evidence of lesion in the choroid: in these it is reasonable to suppose the choroidal focus to be so peripheral as to be out of the field of observation with the instrument. Plastic (exudative) choroiditis often appears under the clinical picture of the so-called serous iritis, but such cases usually present themselves for observation after the stage of circumcorneal injection and descemetitis has passed away.

Speaking of his former description of certain *neoplasms arising from the pigment epithelium of the ciliary body* after a plastic cyclitis, Adolf Alt[1] is convinced that the pars ciliaris retinæ may also proliferate in the same manner, forming new layers or cylinders and cylindrical tubes growing toward the interior of the eye, remaining unpigmented or becoming pigmented at a very late date. These observations seem to have started the history of intraocular epithelial new formations.

The writer speaks of Treacher Collins' announcement of the glands of the ciliary body, the name given to the pegs which spring outwardly from the pigment layer of the ciliary body, especially in its smooth portion, and feels sure that the observer is mistaken as to the special glandular character of these pegs and in assuming that the cell-cylinders are pathologically enlarged glands. The writer refers to a paper in which he has shown that these pegs do not become enlarged in these cases and that they may co-exist in an unaltered condition with the cell-cylinders which grow toward the axis of the eyeball.

**Uveitis.** T. A. Woodruff[2] advises the *treatment* of many cases of *uveitis* and its complications by pilocarpin sweats, especially in conjunction with the internal administration of the iodides. He believes that a definite method of administering these remedies is desirable. As the hypodermics and baths should be given when the stomach is empty, there being less danger from the untoward effects of pilocarpin at that time, they are best administered the first thing in the morning. The patient should be in bed and wrapped up to the neck in a blanket and again covered with at least four blankets. Under the latter half a dozen

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(1) Am. Journal of Ophthalmology, April, 1902.
(2) Journal Am. Med. Assoc., Oct. 26, 1902.

quart bottles containing boiling hot water should be placed. The hypodermic injection of pilocarpin hydrochlorate, beginning with one-eighth of a grain, should now be given, at the same time having the patient drink at least a pint of hot water, weak lemonade or tea. In a few minutes the patient should begin to break out into a profuse perspiration, which should continue for at least two hours, only stopping short of that time if he shows any bad symptoms. At the end of the sweat he should be thoroughly dried and the skin rubbed with alcohol and then allowed to rest the remainder of the day. This treatment should be continued at least every other day until twelve such baths are taken. At an interval of two or three weeks a similar course of treatment should be repeated, and then continued at various intervals as long as any improvement takes place.

The *differential diagnosis* of certain ocular diseases by considering the symptom, pain, is the text of a very suggestive paper by Percy Dunn.[1] The writer reminds us that absence of pain in inflammatory conditions of the eye may be considered a favorable sign. Very little pain occurs in connection with conjunctival affections, but the cornea is especially sensitive and this symptom may be a very important guide in suggesting corneal disease where the lesion is minute. In all cases of doubt the corneal surface should be carefully inspected through a lens. Photophobia is explained as due to exposure (by minute ulceration, etc.) of the corneal plexus. Iritis is not always accompanied by pain and its amount is not always an indication of the severity of the attack, but when the inflammation extends to and involves the ciliary body a distinct tenderness of the globe on palpation is present. In the different forms of iritis the pain symptoms vary. In syphilitic iritis it is very variable, but generally persistent. In rheumatic iritis it is usually present in marked degree, but chiefly at night. In syphilitic iritis the pain when once relieved does not recur and the most effective treatment in the acute case is local abstraction of blood by means of leeches on the temple of the affected side. In the rheumatic form the pain is of neuralgic character, dif-

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(1) Abstract, Journal Am. Med. Assoc., from the Lancet, Jan. 18, 1902.

fering from the throbbing inflammatory type in syphilis and its subsidence is generally the first indication that the attack is passing off. Dry heat is the best application in this class and nothing acts so well as the old-fashioned bran poultice. Leeches are not necessary nor are sedative drugs. Pain in an atrophied globe implies the immediate necessity of enucleation whether there be danger of sympathetic ophthalmia or not. In glaucoma the pain is not due simply to stretching of the sclera, but to the compression to which the ciliary processes are subject during the attack, where the only treatment, of course, is iridectomy.

## RETINA AND OPTIC NERVE.

**Detached Retina.** Gallus[1] gives the histories of eight cases of *detachment of the retina*, which were treated by the method recommended by Dor, viz.: cauterization of the sclera over the detached retina, subconjunctival injections of concentrated salt solutions, and leeching. In three of these other methods had been used without effect. In two cases the treatment had to be stopped for various reasons. In the remaining six there was almost immediate improvement and complete restoration in all but one. Subsequently, however, the detachment recurred and ultimate success was achieved in only one case, and a partial detachment kept from further advance in a second. He believes that in cases in which the diagnosis of a primary subretinal exudate can be made, and not too long a time has elapsed since the appearance of the detachment, the method will always produce a reapplication of the retina, if it can be pursued for several weeks. The vision is usually improved, but all parts of the retina may not recover their full function, particularly perception of color. The method depends partly upon the production of an adhesion between the eye tunics to prevent relapse, and in this respect it may be improved by subsequent experience.

Maravil[2] disbelieves in the *tentative treatment of retinal detachment*, having found that electrolysis serves as the most valuable therapeutic means. The puncture of the

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(1) Zeitschrift für Augenheilk., December, 1901.
(2) Clinique Ophtal., Sept. 10, 1901.

needle, he says, allows a partial escape of the serous exudate, favors the formation of adhesions, and increases the general ocular nutrition. He employs a five to a five and a half milliampere current continued for one minute and controlled by a rheostat. In addition to the electrolysis, he makes use of subconjunctival injections of bichlorid of mercury in solutions of 1:1500 or 1:2000. These injections, he says, should be commenced four days after the use of the electrolysis. The injections seem to maintain the effect of the electrolytic action. After the employment of electrolysis, a compress bandage is to be applied. It should be employed for four days' time. The patient is to be confined to his bed for a period not exceeding six weeks. The electrolytic procedure may be repeated, the author having applied it three times in one case. Ten cases are reported, two having been cured, and the remainder much benefited. None was of more than one month's duration.

**Optic Nerve.** In the *treatment of optic nerve atrophy* Hasket Derby[1] fortifies our faith in the beneficial effects of strychnia. Although most of these cases are necessarily doomed to blindness, he found the march of the disease appreciably delayed or arrested in about one-half the instances, whatever the cause. He employs it by hypodermic injection into either temple alternately. Since using aseptic precautions he has never observed any local irritation. Previous to this abscesses were not uncommon. He begins with .04 of a gr. and adds .01 daily, until constitutional effects are observed, expecting generally to reach at least the tenth injection. By that time the temples are apt to be a little sensitive, so ten days are allowed to elapse and then the course is repeated. In some few cases a third course of injections has been found of advantage. He freely admits that these cases are not brilliant as to results, but the malady is in itself so fatal, and has been regarded as so hopeless, that the smallest chance of relief, whether temporary or permanent, ought not to be allowed to slip. He concludes that strychnia is a stimulant to the optic nerve. Even in normal eyes it slightly increases the acuteness of vision and widens the visual field. These effects are temporary. (Fuchs.) In certain cases of optic

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(1) Boston Medical and Surgical Journal, May 15, 1902.

nerve atrophy its local subcutaneous injection has, to say the least, coincided with an arrest in the progress of the disease, and has been followed by a somewhat increased acuteness of vision. Whether these effects are temporary or permanent, time and fuller statistics will show. In a progressive case of this disease it is clearly our duty to state the above facts to the patient, and allow him to take the treatment if he is so inclined. The strychnia should always be administered in the temple, and by subcutaneous injection.

[The Editor suggests the employment of a 1 per cent watery solution of strychnia nitrate. Use the same (sterile) medicine dropper; begin with five drops (each drop represents about 1-100 gr. of strychnia) and increase one drop daily until toxic effects are produced. Most patients will tolerate 25 drops. Then reduce the dose two drops and continue at discretion.]

**Choked Disk.** Eighty-eight cases of cerebral and cerebellar tumor have been analyzed by H. D. Singer[1] with particular reference to the age at which the symptom of *optic neuritis* shows itself. He says that although statistics are sometimes misleading, yet a table marking the occurrence or not of papillitis at different ages shows such striking features that it is worth recording. The table does not include cases of tumor in the pons (except where there was definite involvement of the cerebellum) because there is some far more important (and unknown) factor involved in the non-occurrence of optic neuritis when this region is the site of the disease.

| Age. | Number of Cases. | Optic Neuritis. | | | | |
|---|---|---|---|---|---|---|
| | | Well Marked. | Late or Slight. | Chronic. | Doubtful. | Absent. |
| Under 30 years............... | 33 | 97.1 | 2.9 | — | — | — |
| From 30 to 40 years.......... | 18 | 76.6 | 2.2 | 1.1 | — | 1.1 |
| “ 40 to 50 “ ......... | 21 | 61.9 | 4.3 | 4.8 | — | 19.0 |
| “ 50 to 60 “ ......... | 7 | 28.5 | 57.1 | — | — | 14.3 |
| Over 60 years................. | 7 | — | 14.3 | — | 28.1 | 57.1 |

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(1) The Lancet, June 14, 1902.

The average of the nine cases in which optic neuritis was absent is 54 years; that of 51 cases in which it was well marked is 28 years. The above analysis justifies the conclusion that absence of optic neuritis in intracranial tumor, exclusive of those occurring in the pons, is rare in cases under 40 years of age and becomes increasingly frequent after that period of life. This result may be found to have an important bearing upon the mode of origin of optic neuritis in that it appears to be dependent for its existence upon the healthy condition of the vessel walls.

## TOXIC AMBLYOPIA.

An admirable review of contributions to the subject of *toxic amblyopia* is given by G. E. de Schweinitz.[1] He believes that a uniform classification of the toxic substances is yet to be devised, but on the whole, that made by Casey Wood is, so far, the most satisfactory. He declares that the case for *ethyl-alcohol-amblyopia* must certainly be allowed and quotes Adler, who found, in his hospital practice, 19 and 81 to represent the proportion respectively due to nicotin and alcohol. Terson has described one case of *absinthe* blindness.

**Methyl-Alcohol-Amaurosis.** The most important form of toxic amblyopia that has been presented during the past two years is undoubtedly *methyl-alcohol-amaurosis* and extracts from the writer's retrospect on this extremely important subject are freely quoted.

According to Harold Gifford, the first case of *methyl-alcohol-amaurosis* which certainly may be classified as an *acute amblyopia* or loss of vision, was reported by Viger in 1877, and was again referred to by Mengin in 1879. The next case was probably observed in this country by J. M. Ray, who examined his patient in 1896 and described the case to a local medical society at the time, but did not report it in any journal. In the following year F. Van Fleet and a year later Mac Coy and Michael recorded their cases, and since this date a number of reports, both in this country and abroad, have appeared and the subject of methyl alcohol amaurosis has assumed great importance.

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(1) Ophthalmic Record, April, 1902.

The pathway of entrance of the poison has usually been the stomach, that is, the methyl alcohol has been substituted for the ordinary alcoholic drinks. Sometimes, however, the blindness has resulted from inhalation (Pattillo and Casey Wood, de Schweinitz, Würdemann, Schapringer, Kipp and J. F. Herbert), aided perhaps by absorption, in at least one instance, through the cutaneous surface (de Schweinitz). That inhalation, however, is not necessarily followed by visual disturbance, as stomachic ingestion of the drug usually is, would seem to be indicated by the following interesting statement made by Swan M. Burnett: "In certain large hat manufactories, where wood alcohol is much employed, the atmosphere of the rooms in which the workmen are engaged becomes so densely saturated with wood-alcohol that the air is drawn off and the wood-alcohol contained in it condensed and shipped back to the manufactory. Workmen living in this alcohol-saturated air, as well as those engaged in making the alcohol itself, are often affected with a kind of intoxication, but it is stated that so far no cases of blindness have been reported."

The amount of wood-alcohol necessary to cause blindness when it is ingested represents a varying quantity. Blindness and atrophy have followed the ingestion of 2 to 5 drachms (Raub), half an ounce (Swan M. Burnett), while recovery from a semi-comatose condition induced by drinking half a pint of this liquor without visual disturbance has been observed (Moulton). This difference in susceptibility is not peculiar to methyl-alcohol, but is seen with many other drugs.

In general terms, and very briefly summarized, the symptoms of this toxemia are: Intense gastrointestinal disturbance if the dose is not too large, followed, if it is greater, by severe headache, giddiness and coma; rapid failure of sight, which later may improve, but soon relapses; contracted visual fields and, if properly sought for, usually absolute central scotomata; and finally total or nearly total blindness. One interesting symptom, particularly pointed out by Hiram Woods, is the great variation in visual acuity, before the case settles down into progressive and permanent atrophy. Ophthalmoscopically there have been noted blurring of the edges of the optic disc, positive optic neuritis, and complete atrophy without signs of preceding inflammation. In many instances there has been diminution in the calibre of the vessels; in others, the retinal vessels have remained of normal size. An important symptom twice noted (Gifford, Kuhnt) is pain on movement of the eyes or on pressing them backward into the orbit.

The *diagnosis* is certainly not difficult, because, as both Hiram Woods and Edward Jackson have stated, there is no other form of blindness which gives clinical features exactly similar to those presented by cases of methyl-alcohol amaurosis.

The *prognosis* of methyl-alcohol poisoning is bad, not only *quoad visum* but *quoad vitam,* a number of cases having resulted in death. The blindness in more than 90 per cent of the reported cases has been practically complete. Now and then, however, recovery to normal vision, or practically normal vision, has been reported, for example, by Kuhnt, Schapringer, Herbert and Kipp, the amblyopia having been caused by inhalation of the fumes of alcohol in two cases and by ingestion in one.

In view of the fact that methyl-alcohol is much employed in the arts, either in the form of the alcohol itself, or in the form of Columbian spirits, which is a liquid containing about 95 per cent of methyl-alcohol, especially by painters, shellacers, workers in hat factories, etc., the recommendation of Gifford that this drug should be labeled "poison" is well taken.

In 1897 A. G. Thomson reported the first case of amaurosis in all particulars resembling the affection which has just been discussed, due to the drinking of excessive quantities of the *essence of Jamaica ginger,* and shortly afterwards the writer examined a similar case. About the same time, chiefly in the public prints, articles began to appear stating that blindness might arise from the excessive use of the *essence of peppermint,* cases of this character having been reported particularly in the northwest of the United States, where large quantities of the drug were consumed in the place of alcohol. So-called *Jamaica ginger-blindness* in December, 1898, was made the subject of a full report by Hiram Woods, who published six cases. In November, 1900, Herbert Harlan again took up the subject of blindness and death from drinking Jamaica ginger, peppermint, etc., and with the aid of analyses performed by an expert chemist demonstrated, entirely satisfactorily it would seem, that the active agent was not the ginger or the peppermint, but the methyl-alcohol with which it was adulterated. The alcohol used in the manufacture of these essences was composed of 75 per cent methylic- and 25 per cent ethylic-alcohol.

[Swan Burnett[1] has reported another case of methyl-alcohol-amblyopia from drinking an ounce and a half of Jamaica ginger. The patient had a permanent central scotoma and loss of his color sense. Vision sank to 5-15 and 5-35. There was also a slight contraction of the fields for white.—ED.]

The same deadly adulteration has been the cause of the blindness which has followed drinking *bay rum* (*spiritus myriciae*), as reported by Moulton, and *cologne spirits,* as reported by Gifford. Naturally the prognosis is as unfavorable as in the pure methyl-alcohol cases, although prompt treatment now and then, as for example in Stieren's case, is followed by complete recovery. The *pathogenesis* of this somewhat remarkable form of amblyopia must naturally attract attention. The orbital pain, the complete blindness followed by marked but temporary improvement and the positive optic neuritis or congestion of the disc which several times has been observed, indicate a primary affection of the optic nerve, that is to say, a retrobulbar neuritis, a conclusion which is still further enhanced by the almost constant presence of central scotomas.

**Tobacco-Alcohol-Amblyopia.** Much attention has been paid recently to the *pathogenesis of chronic alcohol- and nicotine-amblyopia,* and the apparently well-established pathologic lesions of axial degeneration of the optic nerve succeeding a neuritis in this region have been disputed. De Schweinitz further reviews the recent literature of a number of other agents that have produced more or less complete blindness and presents the following objections by Uhthoff to Nuel's theory of macular disease:

1. The usually horizontally oval form of the scotoma which stretches farther towards the temporal side of the fixation point than towards the nasal side, and is conse-

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(1) Ophthalmic Record, June, 1902.

quently not symmetrical to the vertical line of separation, which it ought to be if there were a primary involvement of the macula lutea.

2. The paling of the temporal half of the optic papilla which develops at a period when the disturbance of vision is decidedly improving, for, as Sachs has said, an ascending atrophy could be produced only by a permanent, long-standing tissue change in the retinal center. To assume this, however, in the presence of rapid improvement is impossible.

3. The absence of ophthalmoscopic lesions in the macula, because the slight alterations which have been reported, yellow dots, trifling changes in the pigment epithelium, etc., are often seen in normal eyes of patients who have reached somewhat advanced years.

4. The uncertainty that Nuel's case, in which he found complete disappearance of the ganglion cells in the central portion of the retina with simple atrophy of the nerve fibers, was an intoxication-amblyopia, inasmuch as functional examination had been impossible. Moreover, this anatomic find does not militate against a primary partial interstitial neuritis with secondary descending atrophy.

5. A primary affection of the macula lutea does not explain the regularity of the central scotoma and the partial involvement of the optic nerve any better than a primary affection of the nerve itself. Indeed, it is difficult to give a satisfactory explanation for this except to assume that those nerve fibers are chiefly affected which are functionally the most used and in which correspondingly active metabolic changes are to be assumed.

6. The results obtained by experimentation with certain acute poisonings in animals (methyl-alcohol, quinin, filix mas, etc.) cannot be applied directly to chronic alcohol and tobacco amblyopia, especially if, as in quinin and filix mas, there are very pronounced actions upon the vascular system.

7. The clinical disturbances in vision correspond best with the conception of chronic alcohol and tobacco amblyopia as a primary, partial interstitial retrobulbar neuritis. The fact that the changes may disappear and the vision improve is scarcely compatible with the assumption of a simple atrophy.

Although Uhthoff believes firmly that the primary seat of the affection is in the retrobulbar portion of the optic nerve, he does not dispute that by virtue of long existence of the process the retina may also be involved, which can readily be understood in the light of our present views of the neuron doctrine.

**Sundry Amblyopias.** Since Holden, in 1898, demonstrated that *quinin blindness* depends upon degeneration of the ganglion cells which causes an ascending degeneration of the optic nerve—attributed to the ischemia produced by the drug—his observations, in so far as the ganglion cell changes are concerned, have been abundantly confirmed, particularly by Birch-Hirschfeld and Drualt. That large doses of *salicylate of sodium* can produce blindness has been known for many years, but the number of cases on record is small. An interesting recent one has been recorded by Simeon Snell. His patient, a girl, nine years of age, took, in about sixty hours, 140 to 160 grains of salicylate of sodium, and when examined was perfectly blind. Ophthalmoscopic examination was negative. The patient died shortly afterward from endocarditis. Autopsy was forbidden.

Although it is well known that *santonin* may be responsible for toxic chromatopsia in the sense of yellow-seeing, a retrobulbar neuritis as the result of the ingestion of this drug must be uncommon. One such case has been reported by Inouye.

[W. L. Baum of Chicago reported to the Editor a case where *oil of wintergreen* administered in full doses produced a well-marked and persistent xanthopsia. This instance will be published in proper detail.]

In view of the frequent administration of the *preparations of thyroid gland*, the observation of Coppez reported to the Ophthalmological Society of Belgium, in November, 1900, of retrobulbar neuritis in patients who were taking this drug to relieve obesity is important. Central scotomata were present and the ophthalmoscopic picture was even more pronounced than it is in tobacco amblyopia. Venneman suggested, however, that the ocular condition might be due to the general depreciation of nutrition and not to a direct action of the drug.

Intoxication amblyopia caused by the ingestion of the fluid extract of *hydrastis canadensis* has been reported by Straub.

That the various preparations of *aspidium* (*filix mas*), when taken in toxic doses, may, in conjunction with general symptoms, produce blindness, has been known for many years, and the grave prognosis of the toxemia is evident in Sidler Huguenin's collection of 78 cases; 12 died and 33 suffered from permanent blindness. The amaurotic effect of the drug has been attributed to *filicic acid*, an active principle, and the effect of this medicament has been the subject of much comparatively recent experimental study. Nuel believes he has experimentally proven that the loss of vision depends upon a parenchymatous retro-bulbar neuritis of great intensity. There is also destruction of the ganglion cells of the retina, and he thinks it may not be impossible that there is a simultaneous action upon the nerve and the nervous elements of the retina.

Some recent observations on the effects of the *fumes of dynamite* on eyesight are important and interesting. For example, L. D. Brose has observed blindness in a man who was exposed to the fumes of exploded dynamite and blasting powder; unconsciousness also supervened. Ophthalmoscopic examination showed a pale optic disc, small arteries and distended veins. In one patient, at the last examination, temporal pallor of the disc was evident and vision was restricted to counting fingers. Another patient whose exposure to the noxious gases was less prolonged recovered with perfect vision. F. Vinsonhaler has communicated to de Schweinitz the account of a patient who became blind after exposure to the fumes of dynamite. Ophthalmoscopically the appearances were those of congestion of the disc. G. H. Hogg observed amblyopia with congested discs and very dark color of the arteries and veins in a patient who had been much exposed to the fumes of gelignite, a blasting powder of which *nitroglycerin* is the chief constituent. These observations are interesting in connection with the amblyopias which depend upon *dinitrobenzol*, that have been so well reported by Simeon Snell in England.

The poisonous effects of *bisulphid of carbon* and its deleterious effects on the vision of workers in that branch of the India rubber manufacture in which the rubber is vulcanized by immersion in a solution of chlorid of sulphur in bisulphid of carbon, has been known for many years. So far as the writer knows, only two cases have been examined in this country, one by Henry Ring in New Haven, and another quite recently reported, the first, indeed, to appear in American literature, by F. C. Heath.

From time to time new cases of *iodoform-amblyopia* are reported; for example, mild amblyopia without scotomas in phthisis patients by James W. Russell, retrobulbar neuritis with permanent central scotoma following the treatment of extensive burns with iodoform by L. D. Brose, and a temporary amblyopia after injection of 49 grammes of iodoform during a period of four months for the relief of a tuberculous spondylitis by W. M. De Vries. [Mohr (*Ungarische med. Presse,* Oct., 1901) records two cases, in children, of amblyopia after injection of iodoform emulsion for the relief of large cold abscesses. In the first case 6 injections of a 10 per cent mixture (130 grm. each) were used and in the other 7 injections. In both instances a double papillitis, with vertigo and diminished vision appeared. The symptoms after a time disappeared.—Ed.]

As bearing upon the probable changes in the central visual neurons from *lead intoxication* de Schweinitz comments on D. J. McCarthy's investigation of the cerebral lesions in experimental *plumbic toxemia.* He found marked changes in the ganglion cells of the cortex, and even more striking changes in the cortical and subcortical capillaries, which were very markedly proliferated and their walls greatly thickened. These findings were present in a dog taking large amounts of acetate of lead over a period of two months, and dying as the result of the intoxication.

The attention of ophthalmologists is, by Van der Hoeve,(1) drawn to the toxic effects upon the eye structures of ordinary doses of *beta naphthol.* Several cases are cited in support of this contention. The first patient was a florist, 40 years old, who for the previous half year complained of diminishing vision in the right eye. Vision of the left eye was poor on account of a burn at the age of 8. V. O. D.= 4/60, with—1.5 D.=8/60. V. O. S. 8/36, with + 1.5 D.

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(1) Weekblad von Geneesk., July 20, 1901.

No astigmatism. The lenses in both eyes were cataractous, the opacities being situated chiefly in the posterior cortex. Fundi indistinct, retinæ with a marbled appearance. No sugar or albumen in urine. Half a year ago patient had a facial rash for which he was treated with a salve. At the same time a slight irritation accompanied by lacrimation was noticed in both eyes, since which vision gradually became poorer. At this time Koster for the first time suspected the use of naphthol salve and that it probably was the cause of the cataracts. The family physician reported that the patient had used a 3 per cent b. naphthol salve in yellow vaselin for two weeks on face and neck and then the treatment was ordered discontinued on account of ocular irritation.

The second patient was a boy of 11 who had used a 10 per cent salve of b. naphthol for an exanthem of the scalp. Ten days after beginning the treatment a white point was noticed under the macula of the left eye. Five days later the temporal part of the retina of the right eye showed some greyish white foci and the luster of the retina was slightly disturbed so that a few vessels could not be followed for some distance from the disc. No changes were found in the lenses. The treatment with naphthol was discontinued. Within five days the opacities in the retina had disappeared. The foci in the right retina have changed but little and in one place deposit of pigment has occurred.

A series of experiments on *alcohol amblyopia* leads Birch-Hirschfeld[1] to the following conclusions: He is of the opinion that marked changes in the ganglion cell layer of the retina are always observed before we notice any pathologic changes in the optic nerve. The changes in the retina are not circumscribed in character, but are scattered quite uniformly over the retina (that is to say in the ganglion cell layer) and since in this stage changes in other parts of the retina are absent, we are forced to the conclusion that there is a direct influence exerted by the poison upon the ganglion cells. He regards any involvement of the optic nerve as an independent matter and in no way secondary to the retinal changes and he gives good reasons for his opinion. Inasmuch as neither in the con-

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(1) Archiv für Ophthalmologie, Bd. 54, 1, 1902.

nective tissue septa nor in the neuroglia were there any evidences of proliferation, the toxic action must have been exerted primarily upon the nerve substance itself and not upon the interstitial tissue. But in these cases the degenerative changes are not like those due to other causes, that is to say nerve fibers in the same bundle are not all equally affected, for in those bundles which had undergone pronounced changes there were often to be found normal fibers. This degeneration he does not regard as being caused by edema but as due to the direct action of the poison upon the nerve fibers, the poison being carried to the fibers through the system of lymph-spaces. One would infer from his work that the author holds that the most important changes are located in the optic nerve and in this particular his views coincide with those of Uhthoff [and are opposed to the conclusions of Nuel who first formulated the hypothesis of early changes in the fovea to which the optic alterations are entirely secondary.—Ed.] The optic nerve change does not consist in a primary interstitial inflammation, but in a primary affection of the nerve fibers due to the direct action of the poison, as has been stated, together with secondary involvement of the interstitial tissue.

Bearing directly on this subject, also, is Haab's paper on *secondary atrophy of the optic nerve following disease of the macula.* He has for years observed secondary, ascending atrophy of the macular fibers of the optic nerve in certain affections of the macula, appearing as atrophic discoloration of the temporal quadrant of the optic disc. It is most marked in congenital affections, *e. g.,* coloboma, which, in Haab's opinion, are due to intrauterine or infantile choroiditis. Traumatic affections of the macula contribute the largest contingent. But the atrophy occurs only if the elements of the anterior retinal layer, the ganglion cells, are damaged, *i. e.,* the third neuron of the retina. In accordance with this, traumatic holes at the macula—which generally have the size of one-half the diameter of the disc (0.7 mm.) and thus occupy only the central portion of the central fovea (2 mm.), where the ganglion cells are almost lacking—are, as a rule, not followed by secondary atrophy. Haab is very much inclined to consider the genuine atrophy of the optic nerve in locomotor ataxia and in intoxication amblyopia as secondary to affection of the third neuron of the papillo-macular area of the retina (ganglion cells and their processes), *i. e.*, the disease of the axis cylinders of the optic nerve is secondary, and the primary affection involves the cell body, that part of the neuron most important for nutrition. For illustration, the author reports a number of cases.

*Paresis of accommodation* from eating "bad" eggs is reported by Hennicke. The author was called to see a family, three members of which were unable to see anything clearly close at hand. Distant vision was unimpaired. There was complete paralysis of accommodation. Inquiry elicited the fact that the day before the mother and two daughters had eaten freely of eggs which they thought at the time were far from fresh, to say the least, and the eating of which had been followed by nausea and vomiting. The father had not eaten the eggs and he alone escaped paralysis of accommodation.

**Ergotism.** G. Hennicke[1] believes that *ergotism* may be the cause of a form of keratitis. Some four years ago the author reported an epidemic of ophthalmia among some of the animals in the zoological gardens in his city. The symptoms were those of a very intense keratitis. He concluded that the disease was caused by the food which he found to contain large quantities of ergotin. The following case in a human being only served to strengthen this view of the matter. The patient was a woman, 43 years old, who complained of bad vision in the right eye. The vision in this eye had been reduced to one-half. The ophthalmoscopic examination was negative. The ciliary vessels were slightly engorged and there was a very marked parenchymatous clouding of the cornea, shaped somewhat like a pterygium with the apex directed toward the center of the pupil. This clouding was not complete, but showed here and there normal transparent points. For ten days the patient had been taking for metrorrhagia 25 drops of ergot three times daily according to the directions of her family physician. No treatment was suggested except warm applications which were employed simply as a placebo. The clouding rapidly cleared away. At the time of the next menstruation she was ordered again to resume the ergot which she did and again the corneal clouding made its

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(1) Wochensch. für Therapie und Hygiene des Auges, No. 32, 1902.

appearance with marked visual disturbance. The ergot was at once stopped and the corneal trouble began to disappear. He attributed the corneal disease to disturbances in the general nutrition of this locality caused by the ergotin.

## VITREOUS.

*Vascular growths into the vitreous* are of great interest and are well illustrated by J. E. Jennings[1] in a recent paper. A woman, aged 72, complained of sudden loss of sight in her left eye five years previously. Three months ago the right eye began to fail. With correction of her refractive error VR=5-20; VL=fingers at 1 foot eccentrically. The ophthalmoscope showed in the right eye clear media, optic disc possibly a little paler than normal, but no marked change. Retinal veins and arteries were normal. No disease of other parts of fundus. *Left eye.* By the *indirect method* a moving mass of vessels was seen which suggested detachment of the retina. By the *direct method* the optic disc and retina were found to be normal and there were no evidences of retinal or vitreous hemorrhages.

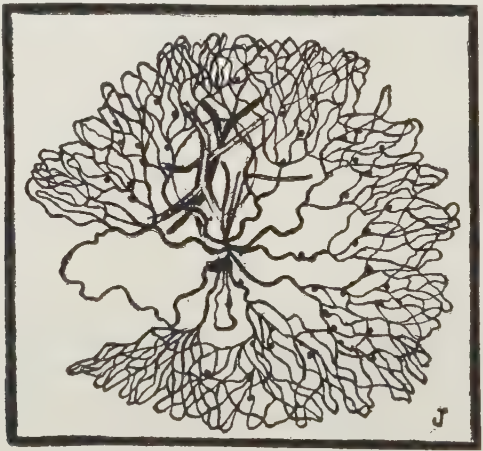

Fig. 6. Vascular Growth in the Vitreous.

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(1) Annals of Ophthalmology, July, 1902.

At the temporal edge of the disc a macular branch of the retinal artery turned abruptly at a right angle and together with two vessels which issued from the depth of the nerve passed directly forward to a small patch of semi-transparent connective tissue situated in the vitreous $2\frac{1}{2}$ mm. in front of the disc. At this point the three vessels subdivided into a dozen or more tortuous branches which spread outward into transparent vitreous-like spokes of a wheel. Finally these vessels anastomosed with one another (see figure), forming a beautiful, delicate and extensive meshwork of fine vessels. Situated at various points of this meshwork, usually at the junction of two vessels, were minute patches of membranous tissue, represented by black dots in the drawing.

Vision of the left eye was finally reduced to light perception. Patient said that about a week ago she noticed a web-like film in front of the left eye which, the next day, took the form of a ball-like cloud attached at one point and moving about. An ophthalmoscopic examination now showed a dense haze of the vitreous so that only a faint outline of the disc could be obtained. With a + 8 D lens the writer could make out only the small patch of connective tissue at the "hub of the wheel," the beautiful meshwork of vessels having entirely disappeared, with the exception of a few fine hazy lines, no doubt remnants of the delicate walls of the empty vessels.

Jennings very properly refers us to a most excellent paper on this subject contributed by Wilbur B. Marple and entitled, "A Contribution to the Pathology of Vascular Growths into the Vitreous," and published in the Transactions of the American Ophthalmological Society, 1901.

## OCULAR MUSCLES.

**Strabismus.** The *non-operative treatment of strabismus* and its complications has during the past year or two attracted something like the attention it has long deserved but which for some inexplicable reason it has not received. An admirable paper by Richard H. Derby[1] emphasizes the necessity of orthoptic treatment not merely to insure cos-

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(1) Medical Record, March 29, 1902.

metic results after operation but in the attempt to secure binocular vision at any period during the conduct of a case of squint. Our whole duty is not performed until we have not only removed a blemish but have enabled the patient, within possible limits, to see with both eyes together. The writer recognizes three classes of amblyopia in monolateral squint. In the first the acuity of vision is diminished, but there is no change in the conductibility of the retinal elements. The condition is one of dulness of the retina. Again, there is a form of amblyopia in which the power of fixation is impaired. The patient makes tentative movements with the macula, which seems to be losing its predominance over neighboring portions of the retina. In the third form the inner half of the retina has better vision than the fovea.

In the first form it is common enough to have an improvement of the vision after the tenotomy. In the second form the improvement is not immediate, but comes gradually. In the last form the chances of improvement of the vision are small. It is in the second category of amblyopia, and especially in the case of young children, that results can be secured by treatment.

Of the first importance is the complete correction of the refractive error. For this purpose nothing less than repeated and complete atropinization is safe. The ametropia once corrected, the isolated training of the amblyopic eye should be begun. To this end, a closely fitting screen over the well eye is necessary; and, for a half-hour at a time, daily, and in some cases twice in the day, the deviating eye is to be exercised. Exercises in reading and writing, under these conditions, are to be insisted upon.

Derby gives the histories of two patients, illustrating the advantage of daily exercise. He also points out that a most important step in the orthoptic training of the strabismic eye is the effort to revive in the patient a desire for binocular vision, and thus recall to the eye its faulty position. The use of the red glass before one eye will, in some cases, provoke diplopia, or a prism with its base up or down before one eye will often cause double vision. It is, however, especially the stereoscope that develops the desire for binocular vision. It is the fusion of the double images in every direction of the axis of vision that is the absolute cure of the strabismus. It is, perhaps, needless to say that in using the stereoscope we are not concerned alone with the convergence of the eyes, but with the accommodation as well, and as the strabismus itself consists in an alteration of the relations between accommodation and convergence, we must first correct the ametropia. The stereoscope used by the writer permits the placing of the half-pictures at any point that may be required to meet the faulty position of the strabismic eye. If this eye has a visual acuity of less than two-tenths, it may be well that but one-half-picture at first be seen, or, if at all seen, that it soon disappears. This stereoscopic exercise is to be followed daily, and the actual lateral distance of the half-pictures from the median line noted. Together, hand in hand with this exercise, the monocular exercise of the amblyopic eye should be continued.

It will be said that it is difficult to make a patient take any interest in the training of an amblyopic eye when the vision of the other is good and there are no asthenopic symptoms that do not disappear when the refraction is corrected. This may be true, and doubtless in the one-sided amblyopia of hypermetropes we find many who have never had any inconvenience from it. Javal brings forward many such cases. This author says of the *amblyopia ex anopsia* that he recalls no case of a child under six years of age where central fixation had been sacrificed. If this be true—if there is a period in child life when systematic exercises of the amblyopic eye may result in improved acuity of vision, should we not in all cases see to it that the weak organ be made strong and the infinite advantage of binocular vision be secured?

Another most useful paper on the same subject is by Dr. Nelson Black,[1] an exponent of Mr. Claud Worth's theories of strabismus and its treatment. He begins by referring to the ignorant or indifferent attitude assumed towards the treatment of squint by laymen and sometimes by members of the medical profession, due largely to the prevalent idea that the child will outgrow it, is too young to be treated, or will always have to wear glasses. He shows the fallacy of these ideas and explains the advantage of the earliest possible treatment of the squinting eyes of

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(1) Journal American Med. Assoc., May 24, 1902.

children: "In rare instances the squint disappears as the patient grows older, but nearly always with vision much impaired in the deviating eye and binocular vision very imperfectly developed. The earlier one can get a patient after he has commenced to squint, the better the prognosis as to the parallelism of the eyes, binocular vision and visual acuity of each individual eye, because the case is in the developmental stage. In regard to wearing glasses, the contrary is true. If a case can be obtained for treatment soon enough after the squint is noticed, the glasses, in the majority of cases, can be laid away about or soon after puberty, being only needed for close application of the eyes, except of course, in cases of high hyperopia, myopia or astigmatism."

Worth believes that the potential factor in squint (taken together with other etiologic factors, as hyperopia, myopia, anisometropia, congenital amblyopia, fundus changes, changes in the refractive media, heredity, local changes in the muscles, etc.) is a defect in, or the non-development of the fusion-sense.

A most valuable and exhaustive symposium on the treatment of strabismus was held at the last meeting of the Ophthalmic Section of the American Medical Association. Among the papers read was one by J. Morrison Ray[1] on the *cosmetic and visual results in the treatment of squint* based on 100 cases in which no visible diseased condition of the eye existed. Each case had been under observation for several months. After discussing the results obtained in these cases, Ray concludes his paper with the following summary: The effect gained in the treatment of strabismus, whether parallelism of the visual axis be obtained by a cycloplegic, glasses, orthoptic exercise, or an operation, is largely, or we might say, wholly cosmetic. Glasses should be adjusted to the eyes of squinting children at as early an age as possible, depending upon the ability of the parent to control the child. They should always be worn for a sufficient length of time to determine their effect upon convergence before any steps in the way of an operation are undertaken. The use of the exclusion-pad and orthoptic training is advisable, not so much in the hope of increasing the vision in the squinting eye, as to improve the

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(1) Journal Am. Med. Assoc., Nov. 2, 1901.

power of co-ordination in the recti muscles, so that when the child reaches the proper age for operation the power of simultaneous muscle action will not have been lost. Binocular single vision is not present in more than 7 per cent of cases of squint, and its production in a larger percentage is uncertain and unsatisfactory. Parallelism of the visual lines does not mean binocular single seeing. Double images are not necessary for a successful issue. Cosmetic results can be obtained and maintained where the fusion power is absent. This is true in monocular squint with great amblyopia as well as in the alternating form. Congenital amblyopia is often found in eyes that do not squint, especially combined with hypermetropia and often in members of a family where squint in others is present.

In alternating squint if the hypermetropia is of a high degree the chances for producing parallelism are better than when the hypermetropia is low. In alternating squint with hypermetropia of a medium degree the necessity for an operation and the difficulties of producing parallelism by tenotomy are greater than in monolateral squint. The effect of a tenotomy is greatly influenced by the amount of abducting power present in the corresponding externus. This should always be especially noted in the alternating variety. Two tenotomies on the same internus is bad surgery, since it invariably leaves a sunken caruncle and later divergence. From a cosmetic standpoint the correction by operation is not as simple as might be supposed. What is gained by straightening the eye, if there is left a noticeable exophthalmos with limited motion of the eye both outward and inward?

[The Editor does not entirely agree with Dr. Ray's first proposition that the results of strabismus treatment are almost entirely cosmetic. In any event the proportion of cases in which stereoscopic vision is obtained after training with the amblyoscope or other form of the stereoscope is certainly larger than 7 per cent. Binocular vision is possible in a majority of the cases in children to the extent of the central acuity of the amblyopic eye (or even a little better than that) although such a result may require the expenditure of months of time and the exercise of much patience on the part both of patient and physician to bring it about.]

The *non-operative* side of strabismus treatment was presented by Edward Jackson.[1] The chief indications are: to bring about normal innervation of the muscles concerned in ocular movements; to place and keep the eyes, so far as possible, upon the best plane of visual acuteness and an equality of required effort; to eradicate abnormal methods of using the eyes, especially dependence upon one eye to the practical exclusion of the other; to develop normal binocular vision—the method of combining the visual sensations produced by the two eyes, and the habit of employing them both in all ordinary seeing.

Jackson emphasizes the very important practical rôle played by the use of proper correcting lenses, which should correct all the ametropia. To determine the latter, cycloplegia is always required. He says that failure to rightly employ lenses is the most common cause of failure to cure strabismus. The writer then speaks of the use of the previously deviating eye and says that, in the majority of cases, this is the first point to be effected. The occlusion pad or bandage, which completely excludes the better eye, is the only thing that will serve the purpose, if the vision of the squinting eye is very much reduced. The use of this pad should be continued until, if this be possible, the worse eye is used for fixation when the other is kept under a cycloplegic. Cycloplegia may be continued after the correction of ametropia, especially in the good eye in monolateral squint, where it may compel the use of the previously deviating eye. If it does not do so the pad must be used. Exercises for the development of binocular vision must be used, and, in young children the fusion tubes of Priestley Smith are of especial value. Next in value to these tubes Jackson places Worth's modification of the reflecting stereoscope.

**Muscle Advancement.** Claud Worth's[2] description of his method of *advancement of a rectus muscle* is by far the most important contribution to ophthalmic myology that has been published this year. The instruments required for it are: speculum, straight blunt-pointed squint

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(1) Journal Am. Med. Assoc., Nov. 2, 1901.
(2) Annals of Ophthalmology, July, 1902.

scissors, toothed forceps, Prince's advancement forceps, needleholder with jaws suited to the curve of the needles, two very sharp curved needles and two sutures.

[Worth properly regards the suture material as of great importance and it is only just to him to say that he prefers thick black silk, made for sewing boots, numbered 24 and made by W. H. Staynes and Smith, Belgrave Gate, Leicester, England.—Ed.]

A reel of the silk is wound loosely round a wire winder. It is boiled in water, to sterilize it and to remove the superfluous coloring matter. It is then dried before a fire. One end is threaded through a hole in a lead weight and the weight dropped into a breaker of very hot paraffin wax to which a little vaselin has been added. In this way the whole thread is drawn through the boiling wax as it is unwound from the winder by an assistant. It is wound on a large glass reel and is kept in a clear jar, always ready for use without further preparation. In preparing for the operation, a piece of the silk about a foot long is drawn out of the jar with sterilized forceps. It is threaded through a very sharp, full-curved eye needle as far as its middle. The two halves of the waxed silk thread are then twisted together with the fingers into a single cord. The part of a suture which experiences the greatest resistance in passing through the tissues is that near the eye of the needle. The thread must be double here, in any case, so one may as well have the benefit of the double thickness throughout. This wax-soaked thread has sufficient stiffness at the ordinary temperature of the air to prevent kinking during the operation; but at the body temperature, it is quite supple. It glides easily, and with a minimum of damage to the tissues—like a well-greased catheter. It is practically non-absorbent—a most important matter in a region which cannot be kept absolutely aseptic. The wound heals more quickly and with less conjunctival edema than when undressed thread is used.

*The Operation.* For quite young children the writer prefers chloroform anesthesia; for older patients cocain is sufficient, either in the form of powder or 10 per cent drops. The conjunctival sac is thoroughly cleansed with boric lotion. Just before beginning the operation a few drops of suprarenal gland extract are instilled (Parke, Davis & Co.'s "Adrenalin" solution acts well).

[In the experience of the Editor both these agents render the operative field fairly bloodless but the post-operative bleeding is usually greater than when neither is employed.]

A drop of the extract and a drop of the cocain, if this be used, are instilled from time to time during the operation. The vascular constriction caused by the extract makes the operation bloodless, or nearly so, so that the surgeon is not impeded in his work by the necessity for constant sponging. A few drops of lotion should be squeezed into the eye every few minutes during the operation, to prevent damage to the cornea by drying.

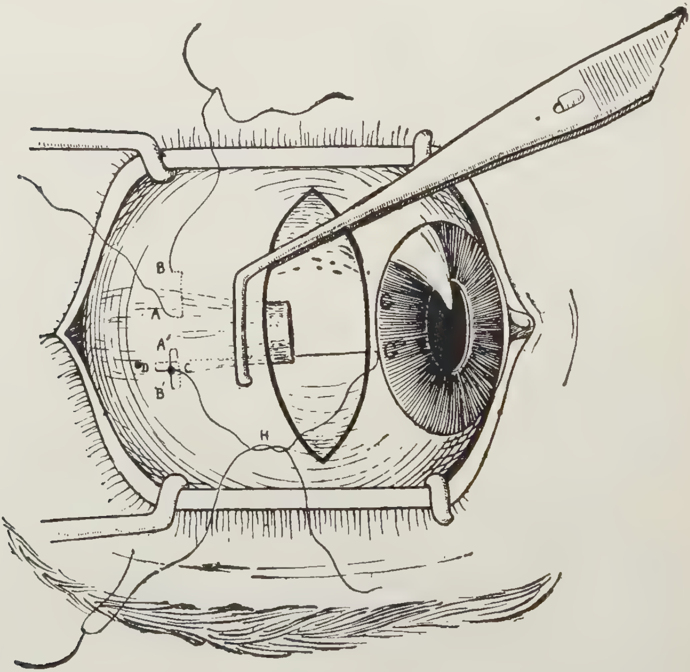

Fig. 7. Worth's Operation.

The patient lies on a table. His lids are held open by a wire speculum. The surgeon standing behind the patient's head seizes the conjunctiva with the toothed forceps, and, with the scissors, makes a straight vertical incision through it, about half an inch long. The middle of this incision comes close to the corneal margin. A similar incision is then made through the capsule of Tenon. The conjunctiva and capsule usually retract as shown in the diagram. If they do not they are pushed back, so as to expose the insertion of the tendon. The female blade of a Prince's advancement forceps is now passed under the tendon, after the manner of a tenotomy hook, the male blade being superficial to the conjunctiva. The forceps is now closed, so that tendon, capsule of Tenon, and conjunctiva are all firmly clamped together, with their relations undisturbed except for the retraction of the membranes. The tendon, and a few little fibrous bands beneath the tendon, are now divided with scissors at their insertion into the sclerotic. The Prince's forceps, holding the tendon, capsule and conjunctiva, can now be easily lifted up so as to get a good view of the underside of the muscle. One of the needles is then passed inward at A (see Fig. 7), through conjunctiva, capsule and muscle and brought out at the under side of the muscle. It is then again passed through muscle, capsule and conjunctiva and brought out at B. The bight of the thread thus encloses about the lower fourth of the width of the muscle, together with its tendinous expansions and capsule and conjunctiva. The other needle is similarly entered at A′, passed through conjunctiva, capsule and muscle, and brought out at the under side of the muscle. It is then entered again at the underside of the muscle and brought out through the conjunctiva at B′, the bight of this suture thus inclosing the upper fourth of the width of the muscle, etc. The object of inserting both sutures before proceeding further with either is that they may be symmetrically placed. The ends of the thread from A′ and B′ are then knotted firmly at C. The end bearing the needle is then entered at D, and passed through conjunctiva, capsule and muscle, and carried beneath the lower blade of the Prince's forceps nearly to the corneal margin. The needle is here passed through the tough circumcorneal fibrous tissue and brought out at G. The two ends of the thread are then temporarily tied loosely, with a single hitch, at H. The first suture is then similarly dealt with. The anterior part of the muscle, capsule and conjunctiva are then removed by cutting them through with scissors behind where they are grasped by the Prince's forceps. The gap is then closed by tightening and securely tying each suture HH, so that the eyeball is rotated into its correct position and the anterior end of the muscle is brought nearly up to the corneal margin at GG. The longitudinal position on the muscle of the knots A B C and A′ B′ C′ varies according to the degree of rotation required. In operating under cocain the immediate effect is the permanent result. No over-correction therefore is necessary. In operating under a general anesthetic the eyes temporarily diverge or converge so that one has to bear in mind the angle of the deviation and produce approximately that degree of rotation.

A firm unyielding hold is secured for the sutures at each end, so that any desired degree of rotation of the eyeball may be produced, according to the position of A B C. In a case in which the deviation does not exceed 15 or 20 degrees, the external rectus is advanced without tenotomy of the internal rectus. For much higher degrees tenotomy of the internus is usually combined with advancement of the externus, not because the advancement will not alone produce all the effect required, but to avoid the retraction of the globe and narrowing of the palpebral fissure which would otherwise occur.

The anatomic relations of the muscle are disturbed as little as possible. As the middle part of the muscle is not included in the sutures, its main *blood supply is not interfered with. In a case of convergent squint there is not infrequently a slight vertical deviation also. If this is not too great it may be corrected at the time of the operation.*

## THE ORBIT.

**Enucleation and Its Substitutes.** *Excision of the eye in infants* is always to be avoided owing to the resulting orbital and facial deformity and to the moral effect upon the individuals thus early subjected to mutilation. Except as a last resort, in such urgent cases as migratory ophthalmia and malignant neoplasms, some substitute operation should be employed. Dianous advises in hydrophthalmus the following procedure: The cornea is slowly cauterized in lines radiating from its center to the depth of two-thirds its thickness. A cone with a radius of 2 mm. is then formed in its center, the apex of which is perforated, allowing the aqueous humor to escape. A bismuth compress and bandage dressing are applied and retained for a period of three days, after which cleansing and bi-daily instillations of cocain-eserin solutions, followed by the application of compress-bandages, are practiced for several weeks' time. If an excess of tension is observed, massage is employed twice daily. If necessary, the operation may be repeated. Tattooing of the globe may increase the value of the method from an artistic standpoint.

As a substitute for *enucleation* de Wecker[1] enjoins tattooing, except in such urgent cases as malignant tumors and sympathetic ophthalmia. The operation is more difficult than on the skin of the arm or trunk on account of the mobility of the conjunctiva and the frequent presence of cicatricial elements. To assist in restoring the size of the globe and of advancing its position, he divides the recti muscles which retract and constrict the eyeball. He details three cases in which the results were so good as to lead patients' friends to the belief that the eye had been restored to normal. He believes that the method would be more generally employed if a better technic were used by its critics.

A simple method of *suturing the tendons in enucleation* is described by Frank C. Todd.[2] While Mules' operation gives by far the best results, there are a few cases where enucleation is selected. In these it is his custom to suture the tendons. After severing and dissecting up the ocular conjunctiva in the customary manner the superior rectus is picked up on a hook, a curved needle is passed from without inwards through the conjunctiva and tendon and out again through the tendon and conjunctiva, thus forming a loop which includes tendon and conjunctiva; the tendon is then severed near its scleral attachment; the internal is picked up with a hook, and the same thread carried on in the same manner through the conjunctiva and ten-

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(1) La Clinique Ophtalmologique, May 25, 1902.
(2) Ophthalmic Record, 1902.

don, after which the tendon is severed. The same thread is carried in the same way through the inferior rectus and external rectus and their tendons likewise cut; the optic nerve is severed and the globe removed. The two ends of the thread are then tied, and the tendons and conjunctiva are thus brought together with a purse-string suture. Scarcely any more time is required to perform this operation than when sutures are not inserted.

Five years ago L. Webster Fox[1] devised *implantation of a glass ball into the orbital cavity* as a support for an artificial eye. Although this method was satisfactory he, eighteen months ago, *substituted a gold for the glass sphere* and made decided changes in the technic of introduction.

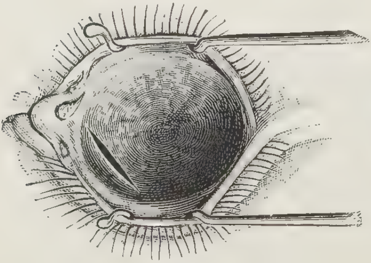

Fig. 8. Fox' Operation.

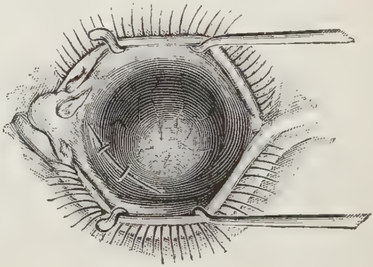

Fig. 9. Fox' Operation.

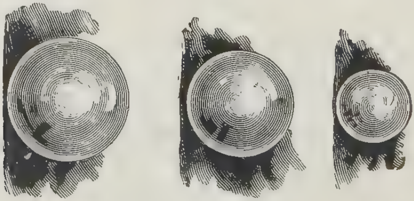

Fig. 10. Fox' Gold Balls.

If the operation is to be performed in the right orbit, from which the eye has been excised and the operation-wound entirely healed, the details are as follows: The eyelids are kept apart by a speculum, the conjunctiva is then grasped, up and in above the inner canthus, and the tissues are well

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(1) New York Medical Journal, Jan. 18, 1902.

pulled out. A Beer's knife or a curved keratome is then passed through the tissues, somewhat obliquely and well down into the orbit; this opening must be made large enough to push the gold globe into the opening behind the tissues, conjunctiva, etc. This starts the opening, which is enlarged with curved scissors, separating the tissues from the cellular tissues around the orbit, thus giving a pouch into which the globe can be inserted. He has discarded glass and silver balls and uses only gold balls 11, 12, 13 and 14 mm. in diameter.

The gold ball is inserted through the opening (Fig. 8) and retained in place by a shell which is modeled after an artificial eye, and which Fox calls a "conformer." There are three sizes for various sized orbits. The incision is closed with two stitches, the conformer placed over the buried ball, and by gentle manipulation on this metal the ball is rotated into place. The circular opening in the conformer allows the gold to fit the space which will be covered by the cornea of the artificial eye. The eyelids are then closed over the conformer, which is left in place 24 hours. The eyelids also help to keep the ball in place. The conformers are made of metal, gold plated. The results obtained by this method are good; healing is by first intention, and the two stitches are taken out on the third day. It can be readily understood that the gold ball cannot break through the center of the conjunctiva, and, as the opening is out of line of pressure, it soon closes up. If the operation is to be performed on the left orbit, the incision is to be made up and out above the external rectus muscle and the dissection carried out as described above.

*Implantation of a wire ball* within the orbit as a substitute for Mules' and similar operations is recommended by Otto Landman.[1] The ball consists of seven vertical circles of silver wire and three horizontal circles soldered at their intersections. The wire used by the writer is about one thirty-second of an inch in thickness, although the thickness is immaterial so long as the ball is substantially made. Three sizes can be used—11, 12 or 13 mm. in diameter. The 11 mm. ball will serve in almost any case.

After enucleation or evisceration in the usual way, the ball is introduced with ordinary dissecting forceps, and is

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(1) Am. Journal of Ophthalmology, May, 1902.

held within the sclera or Tenon's capsule and covered with the tissue by means of three or four sutures passed freely through the tissues, conjunctiva and muscles, and securely tied. A coarse black silk suture is to be selected, which will avoid cutting through the parts. The advantages of this form of ball are: Its lightness; the ease with which any jeweler can make it; it obviates the necessity of any specially devised instrument for introducing it, as in the case of smooth metallic spheres; of *most importance* is its solid *retention* within the tissues by granulation tissue springing up between the wires and binding the ball down permanently. Smooth metallic balls are often extruded, because there is no arrangement to anchor them. The wire ball forms an excellent movable stump which does not shrink.

Recently a number of attempts have been made to improve unsightly conditions produced by sunken lids and shrunken orbital tissues after enucleation, by injecting inert substances beneath the atrophied parts. Stein[1] used a paraffin mixture injected by a special apparatus to be had from Lütgenau & Co., Ziegelstr., 29, Berlin. Pressure by the finger is used to regulate and distribute the injected material. This treatment is of value also in saddle-nose, epicanthus, etc. Suker,[2] of Chicago, has experimented with agar-agar to obtain an improved stump for a prothesis. He uses a 10 to 15 per cent fluid agar solution with fair success, as the mixture remained in position unchanged, but he does not think the method will supersede Mules' operation. He has also used a mixture of two-fifths paraffin and three-fifths vaselin melted in a water-bath.

Lagrange[3] has *engrafted the eye of a rabbit* into Tenon's capsule in eleven cases. He has had but one failure. In the case reported in this communication, the transplanted eye softened and lost one-third of its bulk in three months' time. It then remained stationary in size. The author recommends the procedure as a substitute for Mules' operation and similar plans.

For the *protection of the cornea* in sightless stumps that are perfectly quiet but over which a shell is not tolerated on account of the irritation thus set up, because of the

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(1) Deutsche med. Wochenschr., 39 and 40, 1901.
(2) Ophthalmic Record, September, 1901.
(3) Annales d'oculistique, November, 1901.

danger of irritating and infecting exposed bits of iris tissue, or where the stump is irritable solely from the degeneration of the corneal epithelium, Harold Gifford[1] proposes to cover the cornea either with a conjunctival flap, a Thiersch flap, or an epithelial lip flap. One or other of these operations does excellent service in avoiding the necessity for a more radical operation and in preserving the best kind of support for an artificial eye. It is readily accepted by some patients who will not consent to evisceration or enucleation.

## GLAUCOMA.

As the result of an *experimental study of glaucoma,* E. B. Coburn[2] concludes: Intraocular changes may be induced by deleterious substances in the circulation. The effect of irritating material in the circulation induces, first, congestion of the ciliary body and iris and then vesicle formation in the ciliary region followed by fibrinous exudate into the anterior and posterior chambers. Fibrinous and albuminous exudates have a predilection for the anterior chamber, depositing or forming on the anterior surface of the iris and in Fontana's spaces. These deposits, usually accompanied by deep anterior chamber, block up the exit at the angle and increase the tension. When the irritation is brief the exudate may be absorbed and the tension return to normal. If the irritation is sufficiently prolonged or intense, glaucomatous iritis with its attending evils may ensue. The cause of glaucoma is apparently some lesion which pushes the iris and lens forward, making the anterior chamber shallow and blocking the exits at the angle with the root of the iris. This cause is to be found in the ciliary body and processes.

**Simple Chronic Glaucoma** *and its treatment without operation* is the text of a most valuable essay by C. S. Ball.[3] He regards the disease as quite different from glaucoma with exacerbations and calls attention to the fact that the symptoms which are supposed to characterize simple chronic glaucoma, viz., reduction of vision, narrowing of

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(1) Archives of Ophthalmology, March, 1902.
(2) Annals of Ophthalmology, April, 1902.
(3) New York Medical News, Jan. 18, 1902.

the visual field, excavation of the optic disc, are not peculiar to the disease, for they are all met with in simple atrophy of the optic nerve. He is inclined to think that the unfavorable view taken of operative procedures in simple chronic glaucoma is often due to errors in diagnosis. We must learn to distinguish absolutely between simple chronic glaucoma and a diseased condition of the optic nerve with pre-existing physiologic excavation, and the distinguishing sign is the increase of the intraocular tension. Without this *increase of tension* there is no *glaucoma*. Here is the great difficulty, for in simple chronic glaucoma the increase of the intraocular tension is often so slight as to be far from easy to recognize, and in these cases we may readily confound the disease with atrophy of the optic nerve. Moreover, in this form of glaucoma increased tension is not constantly present, and may be absent for hours and even days in succession. In fact, as we know, the disease presents no active symptoms and it is difficult to fix the date of onset. These periods of increased tension should be searched for with the fingertips placed on the sclera itself and not on the closed lids. Examinations should be made frequently at different hours of the same day or different days. He thinks we are justified in saying that in every case of simple chronic glaucoma there is a slow but progressive increase in the tension, not always to be recognized at first, but which becomes demonstrable after repeated examinations. He points out the seriousness of confounding these two diseases with each other, for the false glaucoma should never be attended surgically, and in a case of true glaucoma we might deprive the patient of the proper remedy. The *prognosis* depends on the type of the disease, the stage of its development, and the amount of degenerative change in the retina and nerve as measured by defects in the visual field.

The question of tension is probably the most difficult one to settle in chronic glaucoma. Schweigger says that there are *physiologically hard* and *physiologically soft* eyes. The writer's experience with sclerotomy has not been satisfactory. Simple chronic glaucoma should always be operated on early in the disease, before much contraction of the field has occurred. The operative effect of iridectomy is more certain and undeniable the earlier it is done. The slightest narrowing of the field, whether for form or color, demands operation once our diagnosis is made. The curative action of iridectomy stands in direct proportion to the increase of tension. Early iridectomy, while the iris is still mobile, the field but little contracted, and the cupping of the disc slight, commonly arrests the disease, at least for a prolonged period, and preserves what sight remains. Done early, it offers the best prospect for the arrest of the process, and its effects are either permanent or very prolonged. If the tension is lowered after iridectomy a favorable result is to be expected. If the tension remains high after operation, we must look for an unfavorable result.

[This article is so largely quoted because it exactly voices the less extensive experience of the Editor who, some eight years ago, translated for the English edition of the *Archives of Ophthalmology* the classic paper by Schweigger on this subject. It is a satisfaction to know that the wide observations of so careful a writer as Bull coincide so closely with those of the great German ophthalmologist.]

Wicherkiewicz,[1] while recognizing in certain cases the great value of iridectomy, makes a plea for eserin and pilocarpin in cases of *chronic glaucoma.* He orders a solution containing eserin 0.01, pilocarpin mur. 0.2, cocain mur. 0.1, aq. dest. 10.0. This solution is dropped in regularly every night and in the daytime only when there are acute exacerbations. He reports a case where the patient was kept for years on this solution with good results and where before, the simple use of eserin had produced no apparent effect upon the glaucomatous condition. He looks upon it as a sovereign remedy for glaucoma simplex.

**Sympathectomy.** The *remedial value of sympathectomy in glaucoma* is fully discussed by Rohmer,[2] based on the histories of 17 cases, in which he had done the operation. These, with Bichot's collection of 74, furnish the material for the following deductions: The results of the removal of the superior cervical ganglion are immediate and remote. The former are chiefly pallor of the face and eye and a slight slowing and weakening of the pulse. Respira-

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(1) Klin. Monatsbl. f. Augenheilk., July, 1901.
(2) Annales d'oculistique, May, 1902.

tion, he says, is not affected. The ocular tension becomes decreased, often below normal. In about five hours after the procedure, a conjunctival injection, which disappears in about a day's time, becomes apparent. At this time, lacrimation and increased nasal discharge may appear. The remote and usually permanent result of the procedure is the diminution of tension, usually passing to below normal and then rising to a permanent normal on the following day. Even in unfavorable cases, the tension remains lowered for several days. The pupil contracts immediately or shortly after the operation, attaining a permanent maximum in twenty-four hours' time. Vision returns quickly and rapidly (in one case progressing from blindness to two-thirds in twelve days' time). Increase in the power of accommodation may at times be noted. The visual fluids become enlarged to almost normal, that is, if there is not any atrophy of the optic nerve fasciculi. Slight ptosis and enophthalmus persisting for several months' time have been noted. The periorbital pain and cephalalgia often disappear rapidly and permanently, but at times may quickly return. The following untoward results have been noted: Development of an acute attack of glaucoma from the simple or chronic type, but of course this cannot be definitely ascribed to the operation. In five of the cases reported by the author, neuralgic pains in the shoulders, the neck, and the side of the face developed from 3 to 15 days after the operation. These pains were intermittent in character and varied in duration, slowly disappearing in a few weeks' to a few months' time, and not bearing any relation to the form of the glaucoma. In two cases there was difficulty in deglutition. These complications, he says, may be ascribed to disturbance of the cervical plexus, to vasomotor changes, and to the destruction of the anastomosing branches uniting the superior cervical ganglion to the trigeminus, glosso-pharyngeal and pneumogastric nerves.

The permanency of the favorable results obtained is not yet definitely settled, although several cases have been followed from one to three years' time, during which time the relief obtained has remained unchanged.

The best results, he says, were obtained in chronic simple glaucoma, five-sixths of this type of cases being ameliorated. Chronic inflammatory glaucoma was bettered in two-thirds of the affected cases. Five hemorrhagic cases were improved, while the acute and subacute forms were least helped. In these last types, he believes that sympathectomy should be employed only after failure of iridectomy.

In performing the operation, the author employed the retromastoidian route, making the incision along the posterior border of the sternomastoid muscle through the deep cervical fascia. This done, the superior cervical ganglion was easily found by blunt dissection. In one case, the author entered the pharynx, but no complication resulted. He does not consider the operation particularly difficult or dangerous.

The value of *sympathectomy in glaucoma* has been recently discussed by Wilbur B. Marple,[1] using for the purpose 86 cases reported by Ziehe and others. He regards the operation itself, in the hands of a competent surgeon, as neither difficult nor bloody, although careful dissection is necessary on account of the proximity to important vessels and nerves.

The writer sums up the present status of the procedure as follows: The operation for extirpation of the sympathetic ganglia is a safe procedure in the hands of a skilful surgeon. While the material (as Ziehe says) is not yet sufficient to reach a positive conclusion as to the permanence of its effect, it is nevertheless established that some of the glaucomatous cases have been improved for some months by resection; in others the condition apparently remains stationary. The results have varied, and one cannot yet be sure in what cases it can be advantageously employed. It at least, apparently, does no harm. A considerable number of favorable results have been reported in chronic irritation or inflammatory glaucoma as well as in simple glaucoma, in which oftentimes pain is abolished. It does not replace iridectomy, but may possibly supplement the latter, in case this is refused or has already resulted disastrously in the other eye, or is contraindicated, as in hemorrhagic glaucoma, dacryocystitis, etc. Until our cases are observed more carefully and for a longer period of time, it will be impossible to arrive at positive conclusions

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(1) Medical Record, May 10, 1902.

as to the indications for the operation, or as to its permanent results.

[The failure of iridectomy, sclerotomy and other procedures to cure or even to impede the progress of many cases of glaucoma certainly justifies an operation as serious as sympathectomy or the removal of all three cervical ganglia, but, on the whole, the experience of American surgeons is not in its favor.—Ed.]

**Iridectomy.** Swan M. Burnett,[1] speaking of the difficulty of making an effective *iridectomy in acute glaucoma,* either with a Graefe knife or a keratome, advises a method of operating which the Editor has successfully employed and which he strongly commends. As is well known the anterior chamber is practically abolished, the iris is reduced to a narrow rim or almost hidden behind the margin of the sclera so that the ordinary corneal or sclero-corneal incision is often imperfectly made or involves injury to iris or lens, or both. Burnett makes an opening into the anterior chamber from without, by successive strokes with a point of a Graefe knife, following the curve of the corneal base as far behind the clear cornea as is desirable for the most peripheral position of the wound, cutting the layers at the sclero-corneal junction as evenly as possible; the bottom of the wound thus carefully made finally gives way at some point, and through this opening there is a gush of aqueous and usually a prolapsed iris. A triangular knife with a bulbous point is then introduced into the wound and the section of the already thinned tissue completed; the bulbous point protects the lens and cornea from any injury. A short, thin, straight knife with a bulbous point can also be used for the same purpose, or even a blunt-pointed scissors. The iris is seized with the forceps and cut in the usual way. Bleeding is done away with by the use of suprarenal solution. A special knife having the shape of a hatchet with a slightly rounded cutting edge of 3 or 4 mm. length might be specially constructed, but the writer has found a rather short, stout Graefe knife quite sufficient.

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(1) Am. Journal of Ophthalmology, April, 1902.

# INJURIES TO THE OCULAR STRUCTURES.

**Migratory Ophthalmia.** Grunert[1] reports a case of *sympathetic inflammation*, following traumatic perforation of the fellow eye, which began as a chronic, serous iridocyclitis, with increase of tension, and resulted in loss of the eye, after successive attacks. No microörganisms were found, either in the coverglass preparations, or in the cultures, nor were any discovered in the microscopic section of the eyeball. Histologically, the chief changes were seen in the iris and ciliary bodies, viz., round cell infiltration of these structures in places and marked atrophy of the tissue in others. There were also exudates in the anterior chamber; peripheral attachment of the iris and cornea; rupture of Descemet's membrane; infiltration of the cornea; occlusion of the pupil; cataractous degeneration of the lens; circumscribed cell accumulations in the choroid, especially near the optic nerve entrance; degeneration of retina; excavation of the papillæ, with advanced atrophy of the nerve fibers, moderate infiltration around the central vessels, and hypertrophy of the septa. The inflammatory appearances decreased markedly a short distance back of the globe, and were not demonstrable 10 mm. away from it. He concludes that despite the investigations of the past year, we must admit that we are still far from knowing the true nature of this strange process.

[The destructive action of toxins upon the "sympathizing" eye has not received the attention it deserves. Randolph's investigations on the rôle of these agents in ocular inflammation demonstrate that they directly incite inflammation, while they, of course, could not be readily detected in the fluids and tissues of the second eye.—Ed.]

*Rupture of the choroid* is almost always crescentic in shape with the concave surface presenting toward the papilla. Such a case, with peculiarly placed hemorrhages is reported by E. O. Sisson[2] and pictured in the accompanying figure. It occurred in a boy, aged 16, who was hit with a stone. Eventually vision was reduced to counting fingers

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(1) Klin. Monatsbl. für Augenheilkunde, November, 1901.
(2) Journal Am. Med. Assoc., Jan. 11, 1902.

at six inches. The nerve head was grayish and the choroidal rupture also involved the retina.

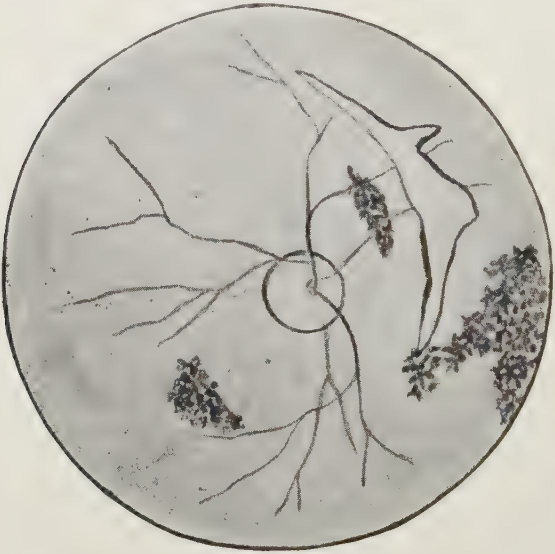

Fig. 11. Rupture of the Choroid (Sisson).—(Jour. Am. Med. Assoc.)

**The Giant Electro-magnet.** After the use of Haab's giant magnet in nine cases, Holmes Spicer and A. F. MacCallen[1] find that when the patient is exposed to the magnet it is the rule for severe pain to be experienced by him if a magnetizable particle is present in the globe. Haab's magnet is therefore of valuable diagnostic service in determining the presence or absence of a magnetizable particle. Localization by the X-rays is extremely important. By this means it is sometimes possible to avoid injury to a clear lens in the extraction of a foreign body, and entanglement in the iris can be avoided if its precise situation is known. Nevertheless if some delay is unavoidable before the X-rays can be applied, it is advisable in certain cases to immediately extract the foreign body by Haab's magnet without precise localization; for example, a case

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(1) British Med. Journal, Jan. 18, 1902.

in which there is considerable inflammation or one in which there is a recent traumatic cataract. In each of these cases there is considerable danger in delay.

If there is a recent wound the writers attempt to remove the foreign body through it, using Haab's magnet alone. If this wound has firmly healed it is necessary to make an opening for its exit. This may be either corneal, in which case the foreign body is withdrawn by Haab's magnet; or peripheral, in which case they usually employ the small magnet for the removal of the foreign body from the anterior chamber after it has been brought forward by Haab's magnet. The latter method is the one they generally adopt. In all cases it is most essential that entanglement of the particle in the iris and ciliary body should be avoided. By bringing the patient up to the magnet gradually from a distance, and by increasing the strength of the current up to the maximum slowly, this is to a certain extent guarded against. The idea of this maneuver is to prevent the particle from rushing forward from its posterior position and burying itself in the iris.

**The Hirschberg Magnet.** The occasions that call for the use of the small (Hirschberg) *electromagnet* as opposed to the indications for the giant (Haab) instrument in the extraction of foreign bodies from the interior of the eyeball are set forth as follows by A. Barkan[1]: 1. The Röntgen rays offer the most certain method of detecting and locating foreign bodies in the eye. 2. The position of the foreign body should be determined in all cases before magnet extraction is attempted. Frequent insertion of the small magnet into the vitreous in the hope of finding the metal injures the eye and renders later attempts at extraction difficult, while the employment of the large magnet is not without danger when the position of the body is not known. 3. Early extraction offers the best chance of saving the eye. When the track of the body is through the cornea and lens, its position in the vitreous will indicate whether less damage will be done by removing the metal through the open entrance wound or through a new opening in the sclera close to the indicated position of the body. [In his Saratoga address (June, 1902) Haab insisted upon the careful attraction of the iron fragment

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(1) Archives of Ophthalmology, January, 1902.

into the anterior chamber from every position in the vitreous as a preliminary to its removal through the cornea, either by way of the wound of entrance, if not more than a few days old, or through a special incision, if need be.—Ed.] 4. The more extended use in the future of the larger magnet in cases of steel in the vitreous chamber to draw the metal to an opening in the sclera, after its position has been accurately determined, will probably achieve better visual results than have been obtained in the past with the small magnet introduced into the vitreous. 5. Iron or steel which has remained in the eyeball until a fibrocellular covering envelops it cannot be dislodged with the magnet. Extraction with forceps and the employment of normal salt solution to replace any vitreous lost, has resulted in several instances in eyeballs of good cosmetic appearance, and is an operation worthy of trial. Forceps extraction must also be employed when the body is of copper or glass. 6. Extraction is a safe operation, and under proper precautions is free from the dangers of panophthalmitis or meningitis.

## TUMORS.

**Angioma.** A case of lymphangiectatic elephantiasis and *cavernous angioma* of the lids is reported by Königshofer.[1] The patient was a seamstress with a negative family history. When she was six weeks old, it was noticed that the left side of her face began to develop more rapidly than the right. Since the age of 3 years and until 4 years before being seen by Königshofer, the patient had yearly attacks of erysipelas affecting the left side of the face. At the age of 7 she had her left eye injured by a stone. Following this, began the development of the tumor-growths, which he describes as follows: The left side of the face was thickened, especially the upper lip. The tongue was larger than normal, particularly its left half. The nasal passages were practically normal. There was a slight goiter. On the outer half of the upper lid a poorly limited, firm, pale pink tumor of the size of a hazel nut could be seen, while near the internal canthus there was situated a smaller and

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(1) La Clinique Ophtalmologique, January, 1902.

softer reddish-blue mass. On the lower lid there was a soft reddish-blue growth which was twice the size of the first one described. Ocular examination except for the presence of a moderate degree of ametropia, was negative. These growths were excised at intervals, relapses occurring twice. Complete relief was obtained after their second removal. Microscopic examination showed the masses to contain enlarged lymph spaces and vessels.

**Adenoma of the Caruncle.** A second case of *adenoma of the lacrimal caruncle* is reported by C. A. Veasey[1] (first case reported by him in the *Archives of Ophthalmology,* No. 2, 1897), a histologic examination of the tumor having been made by E. A. Shumway. The subject of the neoplasm was a woman, aged 57 years, who presented at the end of 1900 a minute bluish-red spot, about the size of a pin's head, situated in the right lacrimal caruncle. It lay beneath the surface, the caruncular tissue overlying it being translucent, was slightly ovoid in shape, and presented the external appearance of a minute angioma. No family history of tumors of any kind could be elicited. Beyond a very moderate conjunctival irritation at times, no symptoms were occasioned by its presence. It was readily removed by forceps and scissors under cocain anesthesia. Shumway's report is as follows: "Microscopic examination reveals an oval, well circumscribed nodule embedded within the caruncle, measuring 1.4x1 mm. in diameter, in the celloidin sections. The nodule is composed of a convoluted mass of tubular gland acini, each of which possesses a distinct basement membrane, lined with tall narrow, columnar, epithelial cells. The nuclei are oval, and are situated at about the middle of the cell; the protoplasm surrounding the nucleus is granular, and sections passing at right angles to the long axes of the cells show that in cross section they have a pentagonal outline. At irregular intervals there are interposed, between them and the basement membrane, flattened polymorphous cells, with well staining nuclei. The contiguous acini are in close apposition, their basement membranes being separated only by a small amount of connective tissue, which carries thin-walled blood vessels and contains a few flattened connective tissue cells and a moderate number of

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(1) Annals of Ophthalmology, July, 1902.

round cells. Many of the acini have a narrow lumen, but most of them are widely dilated and show a tendency to cyst formation. They contain a fluid, loosely coagulated into small drops, which stains faintly with eosin. Some of the more widely dilated acini contain, in addition, a denser, amorphous exudate in which the debris of cast-off cells may be recognized. The acini are everywhere regular, and there is no breaking through of the basement membranes by the lining cells, nor infiltration of the surrounding tissues. At one end of the caruncle there are cross sections of circular tubules, lined with cuboidal cells, which have the appearance of excretory ducts. The nodule has no distinct capsule, although the surrounding connective tissue has been so condensed by its growth as to suggest such a structure. The caruncle shows a moderate round cell infiltration, especially around the minute hair follicles and the sebaceous glands. The surface epithelium is thickened and contains numerous goblet cells. There is no trace of the compound tubular gland which is commonly present, and despite the difference in the form of the lining epithelium, it seems probable that the new growth has developed from this structure. The growth is, then, a benign *cystic adenoma (cystadenoma)* of the caruncle developing from the tubular glands in this position."

**Dermoid Cyst.** Jas. Moores Ball[1] describes one of these rare growths, the examination of the excised tumor having been made by Carl Fisch, of St. Louis. The subject was a farmer, aged 40. Eight years ago he noticed a small red spot at the corneoscleral junction on the nasal side of his right eye. It grew slowly without pain except during a brief attack of conjunctivitis. At this time the growth was rounded; about eighteen months ago he noticed that it had become elongated vertically and seemingly was divided into two lobes, an upper and a lower. Examination showed the inner canthus and part of the nasal aspect of the right cornea to be occupied by a hard and inelastic tumor, only slightly movable and of a pale-yellow or straw color. Along its upper and lower borders, and passing over it in an antero-posterior direction were numerous minute blood vessels. The growth measured vertically 13 mm.; horizontally 10 mm.; its height was

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(1) Annals of Ophthalmology, July, 1902.

3.3 mm. and it extended upon the cornea 5 mm. At the inner canthus a pterygium-like mass was attached to the inner margin of the upper eyelid through 2 mm. of its extent and also covered the caruncle. This tissue, passing from the inner canthus, was thin and tense, and apparently raised by the underlying tumor, over which it was attached to the cornea. Pathologic examination showed a tissue richly supplied with spaces. These spaces are lined with layers of epithelial cells resting on a layer of dense, thin, fibrous tissue, under which is areolar tissue—the whole resembling the structure of the skin. No sebaceous glands or hair follicles were present, although careful search was made for them.

**Primary Sarcoma of the Iris.** Casey Wood and Brown Pusey[1] have published an extensive study of primary *sarcoma of the iris* based on the observation of cases occurring in their own practice, in the practice of ophthalmologists who had not hitherto published them and upon examples of the neoplasm already described in literature. No case was included where the diagnosis had not been verified by a histologic examination. Altogether some ninety reports of this character were gathered and analyzed. The practical lesson taught by this investigation is that sarcoma of the iris, like similar tumors in other parts of the body, should be extirpated, when possible, as soon as a diagnosis is made and that *enucleation* of the whole globe (and *not* iridectomy) should be immediately performed as presenting the surest safeguard against recurrence.

**Cysts of the Iris.** Terrien[2] describes four forms of *cyst of the iris.* In order of frequency they are serous, pearly, entozoal, and dermoid. Pearly cysts are always traumatic in origin and are the results of inclusion of epithelial cells after penetrating wounds. Such cysts spring from the anterior surface of the iris to which they are attached by connective tissue and have a true pearly appearance. At times, they are bosselated and may be caused by the presence of cilia. Microscopically, such cysts consist of concentric lamellæ of epithelial cells among which may be found cholesterine crystals. The author has produced such a cyst experimentally. When penetration

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(1) Archives of Ophthalmology, No. 4, 1902.
(2) Archives d'Ophtal., October, 1901.

of the globe has not occurred, the cyst results from deposits on the iris of cells that have been detached from the posterior surface of the cornea or from the anterior capsule of the crystalline lens. Dermoid cysts of the iris have the usual etiology and are very rare. Follin reported one in a woman of 70. Post-mortem examination revealed a rounded tumor 1 centimeter in diameter lying between the choroid and retina in the upper part of the globe. The surface of the mass was furrowed, corroded, and covered with medium-sized hairs. Histologic examination showed it to consist of several layers analogous to those of the skin and the subcutaneous tissue.

**Tumors of the Choroid.** Rogman[1] reports a case of *tubercular tumor of the choroid and sclera.* It occurred in an 8 year old child who furnished a history of chronic diarrhea, bronchitis and several cold abscesses with fistulous formations. During the previous year the left eye had slowly become blind. Examination showed a small rounded tumor-mass on the lower inner part of the globe, 7 mm. back of the limbus. Over this the conjunctiva was adherent and slightly eroded. The anterior portion of the eye was normal except for the absence of iris action. The media were clear and the retina was completely detached. Intraocular tension equaled minus two. Enucleation was performed. After hardening and section, macroscopic examination revealed a tumor of the sclera and choroid having a maximum width of 1 cm. reaching from the optic nerve to the ciliary body. Microscopic study showed a large infiltration of leucocytes with scattered foci of epithelial and giant cells surrounding a center of necrosis. The adjacent parts did not exhibit any gross change. The general condition being taken into account, a diagnosis of tuberculosis was made. Eighteen months after operation, there was no local or general return of the disease.

A case of *melano-sarcoma of the choroid,* whose origin was attributed by the patient (a woman, aged 35) to an injury by a piece of flying wood four months before, is reported by Frederick Krauss.[2] The eye became red and painful after the accident and vision was greatly lowered in spite of treatment at a dispensary. The history was nega-

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(1) Annales d'Oculistique, March, 1902.
(2) Annals of Ophthalmology, July, 1902.

tive and she denied any ocular discomfort prior to the injury. The corneæ of both eyes were clear, the pupils oval and 3 mm. in diameter; the left iris responded freely to light, accommodation and convergence. The pupil of the right eye was sluggish, but responded freely when exposed consensually. *The tension of the right eye was somewhat diminished,* the anterior chamber shallow. The vision of the affected eye was limited to a small excentric area of light perception directly below the middle of the field, as indicated upon the accompanying chart. In this position a small piece of white paper, 2 cm. in diameter could be distinguished. (See Fig. 12.) A large growth occupied two-thirds of the visible area of the fundus, and was best seen with +20 D. It was bright red in color and very richly supplied with blood vessels which ran over the exposed surface. Above and slightly anterior to the growth, on both sides, were small, bluish-white saccules of detached retina loosely filled with thin fluid. These saccules moved freely when the eye was turned. The pupil

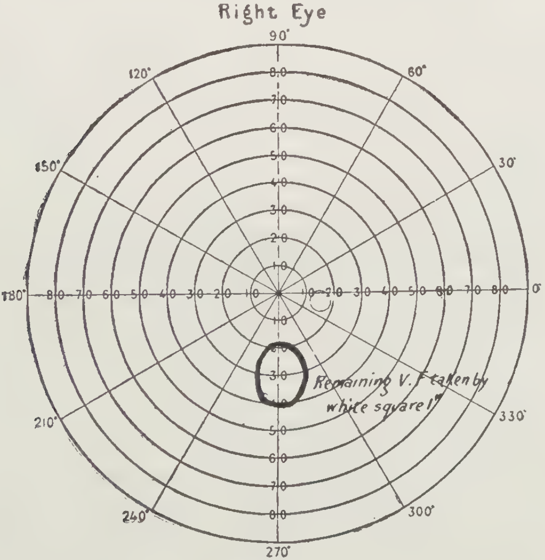

Fig. 12.

dilated fully and evenly with homatropin. The growth had an irregular surface, and was pressed against the posterior capsule of the lens below. Numerous vessels of the size of a main branch of the retinal artery ran over the surface.

This eye was enucleated August 15, 1899, and an artificial eye inserted. There was no recurrence up to February, 1902. Edward A. Shumway reports as follows: The tumor mass arises from the choroid, and is made up exclusively of spindle-shaped cells, the nuclei of which fill up the greater part of the cells. The cells are arranged in bundles. The central part of the mass shows but a few scattered pigment cells, while the scleral, anterior and posterior borders are lined with densely pigmented cells. There are no large blood vessels in the tumor mass, the blood being supplied by fine capillaries running between the bundles of cells. The sclera has not apparently been invaded.

Two cases of *choroidal sarcoma* are reported by A. V. Würdemann.[1] In one (woman, aged 48) there was no recurrence for more than six years after the excision of the diseased eye. As in the case of Krauss *(vide intra)* the tumor was thought to be due to injury (a blow on the right eye) received some six months previously. The eye was and had been perfectly quiet. The history was negative. The left eye was normal. Vision in the right eye =6-60. The field of vision is shown in Fig. 13. Tension normal.

By oblique examination, the pupil being dilated, a rounded bluish mass was visible behind the iris. Direct illumination by the ophthalmoscopic mirror showed the retina detached at the lower half, beginning below the optic disc. Under this there was a greenish area, due to the sub-retinal exudate. The whole lower portion of the field was occupied by a rounded purplish mass, over which coursed blood vessels, there being a well defined space between the apex of the tumor and the retina. The patient returned three weeks later, at which time the vision was reduced to counting fingers at three meters. She had no pain, although the tension was now perceptibly increased. Enucleation under ether was done April 20, the

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(1) Annals of Ophthalmology, July, 1902.

location of the tumor being marked by a black thread in the conjunctiva. Patient had uninterrupted recovery, and was fitted later with an artificial eye. Since the operation she has had no symptoms.

The macroscopic specimens (see Figs. 14 and 15) are of an eyeball normal in size and shape except as shown. Especially noticeable are the venæ vorticosæ and the choroidal fetal cleft. (See Fig. 14.) This is the larger section, the eye being cut a little out of the median line, although through the center of the tumor. The latter is the size of a large pea, arising from the choroid near the ciliary body, at the lower portion. The growth is white, although covered by the dark pigment coat of the choroid and the retina. It has as yet disturbed none of the intimate relations of the ocular structure, except the choroid and retina. The latter is detached back to the optic disc,

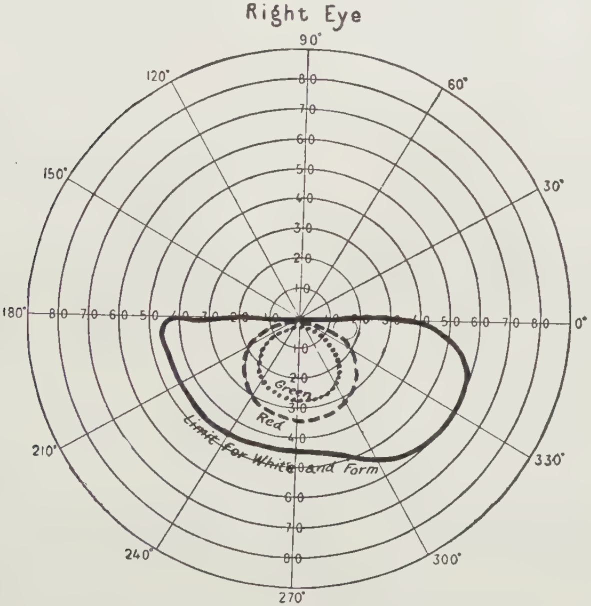

Fig. 13. Hemianopic visual field in sarcoma of the choroid.

this space being filled by a subretinal exudate which in section appeared of a colloid nature, and of a firmer consistency than the vitreous.

In the opposite section, the retina is extensively detached by reason of the exudate, and thrown in folds. It retains its normal appearance in other respects, and the macula lutea shows distinctly to the naked eye. (See Fig. 15.)

The microscopic section shows the tumor to be made up almost entirely of typical non-pigmented, small round cells, there being but little connective tissue stroma. The choroidal tissue is entirely replaced by the new formation. The sarcoma cells are limited to the tumor itself, none being found in the vitreous or other structures, which retain their normal microscopic appearance. The subretinal exudate is of a homogeneous colloid nature.

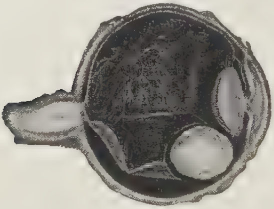

**Fig. 14.** Lateral half of eyeball with sarcoma of the choroid, showing normal relations of the ocular structures and the tumor.

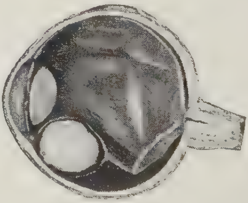

**Fig. 15.** Lateral half of eyeball with sarcoma of the choroid, showing extensive retinal detachment and the tumor.

In Würdemann's second case, that of a man of 52, the history is negative. He noticed failing sight, but no inflammation of or pain in the eye. The right eye was practically normal. VL= fingers at 1 meter, better vision downwards. A rounded, bluish mass (see Fig. 16) was seen by the oblique illumination through the dilated pupil. After excision of the eye a circumscribed tumor was found in about the same locality as in Case I, the anterior portion of the choroid in its lower half near the ciliary region. The retina was detached over and behind the tumor, there being a subretinal exudate of the same character. Microscopic section showed that the tumor was made up of typical pigmented, small-round-cells, there being considerable connective tissue stroma. The choroidal tissue itself was entirely replaced by the neoplasm. The sarcoma cells were likewise, in this case, limited to the tumor, none being found in the other structures of the eye.

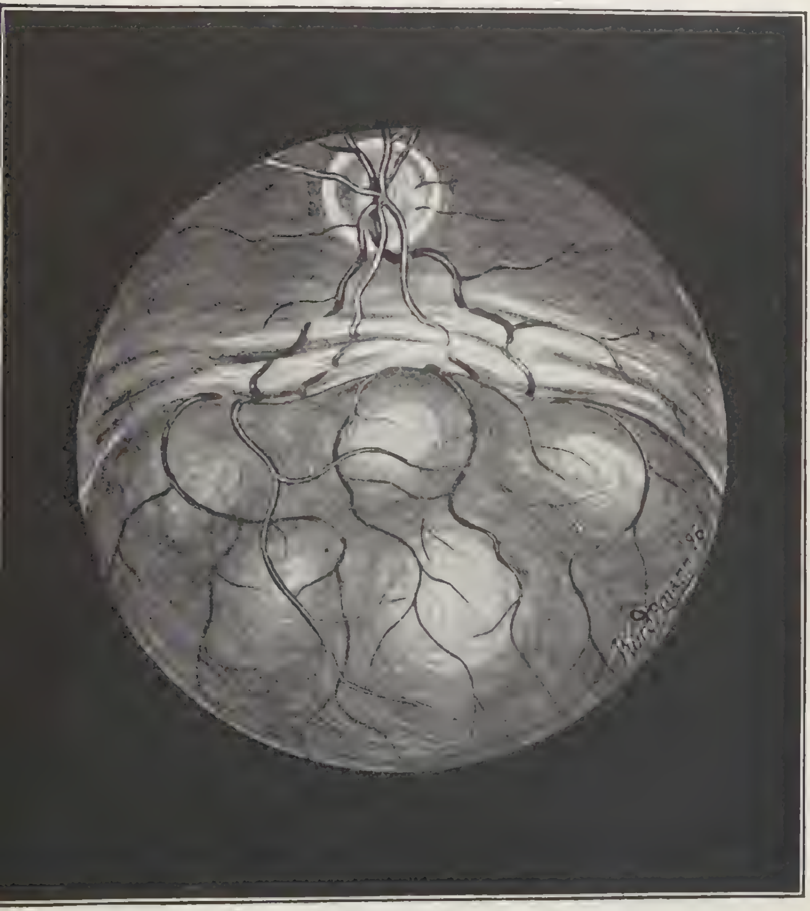

Fig. 16. Fundus oculi by direct ophthalmoscopy in sarcoma of the choroid.

After two years there had been no return of the disease.

**Retinal Sarcoma and Glioma.** Glioma is no longer regarded as the only neoplasm of retinal origin. Teillais[1] says that Greef has shown *sarcoma of the retina* to be more frequent than glioma. He reports a case in a child where death shortly followed excision of the globe. The enucleated eye was hardened in formalin. The growth filled the vitreous chamber and presented a marbled aspect throughout. The tumor-mass was composed of perivascular tubes formed by round cells at the periphery and epithelial cells in the center, these tubes being separated by zones of more or less marked degeneration. The part of the neoplasm developing at the expense of the choroid contained larger and more deeply staining cells held in the meshes of an abundant reticulum. The vessels were more numerous in the portion that was situated within the pigment epithelium and had the appearance of lacunæ—some of which possessed very thin walls. Interstitial hemorrhages were frequently seen.

**Pseudo-Glioma.** Sourdille[2] emphasizes the great difficulty in the differential diagnosis of *intraocular tumors* in children's eyes, neither the so-called "amaurotic cat's eye" nor increase of intraocular tension being absolute pathognomonic symptoms. In his own experience, *three of the ten eyes that he had enucleated for glioma had proven to be nothing but cases of pseudo-glioma.* He cites two interesting examples: The first was that of an infant, a few months old, with a family history of tuberculosis. After having shown the characteristic amaurotic cat's eye for several months' time, the child suddenly developed the usual subjective and objective signs of a severe iritis. A nodular condition of the iris with diminished tension led to a diagnosis of tuberculous iritis. Section of the globe demonstrated a tubular form of glioma. [This case is one of a class to which has been applied the term *cryptoglioma.* See the review in the Practical Medicine Series for 1901. —Ed.] The second case was seen in a five-year-old child, who, eight days before being seen, felt a violent pain in the left eye which was the seat of congenital cataract. Examination showed the usual symptoms of acute glaucoma with the addition of a yellowish irregular body situated in the pupillary area. Glioma was diagnosed, but section re-

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(1) Annales d'Oculistique, May, 1902.
(2) Clinique Ophtal., Oct. 25, 1901.

vealed the presence of a persistent hyaloid artery with a vascular lens sheath. To this membrane, separating the anterior and the posterior chambers, was attributed the glaucomatous state. The author recommended transillumination and puncture as aids in the differential diagnosis of such intraocular conditions.

**Kroenlein's Operation.** The successful removal by Krönlein's method of an encapsulated *sarcoma of the optic sheath* is reported by F. A. Pockley.[1] The patient was a healthy lad of 13 years. For the last six or eight months without apparent cause the left eye had gradually become more prominent and, lately, the sight had become affected. There was no pain and no inflammation, and on examination the left eye was found pushed forward $\frac{3}{8}$ of an inch. There was free movement but diplopia; the tension was normal and the pupil unaffected; V=5/12. On deep pressure with the finger tip in the lower outer segment of the orbit there was an indistinct feeling of resistance. A Krönlein's operation was performed and a firm smooth tumor was found attached to the optic nerve along about $\frac{3}{4}$ inch of its length. It was not necessary to divide the external rectus or any structure to reach it and it was easily stripped off from the nerve. After the detached bone was pressed back into position and the skin wound sutured, the eye went back immediately. The movements were unrestricted and the vision was the same as before the operation. The tumor was found to be a round-celled sarcoma completely encapsulated. [It is to be hoped that the writer will give a supplementary report of this case.—Ed.]

A case of *angiofibroma of the orbit* and a description of its removal by a modified Krönlein's operation is reported by Parinaud and Roche.[2] The patient, a woman, 28 years of age, presented herself in 1894 with a marked exophthalmos on the left side. After the usual preparation, a vertical incision of some 4 to 5 cm. in length was made in the scalp region at a position 5 cm. back of the orbital border. From the upper end of the incision forward to the supero-external angle of the orbit, and as far up as the brow, another cut was extended; with a third from the same extremity to the infero-external orbital

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(1) Australian Medical Gazette, September, 1901.
(2) Annales d'Oculistique, October, 1901.

angle parallel with the zygomatic arch. The cutaneous flap thus formed was dissected free, the superficial temporal fascia was divided, and the periosteum was incised along the edge of the malar bone and separated from the outer wall of the orbit. With a pair of flat scissors, horizontal incisions were made in the bone at the fronto-malar junction and at the head of the zygomatic process. The bony fragment that remained attached to the temporal muscle, which had been incised along the lines of the osseous incisions, was next turned backward. These procedures accomplished, the orbit was easily entered. The tumor was found to be independent of the optic nerve and had a small pedicle. It was removed. Hemorrhage was controlled, the parts readjusted, the skin sutured, and an aseptic gauze dressing applied. Convalescence was uneventful. The author emphasizes the following advantages in his modification of the procedure: more room, absence of danger of infection due to the distance of the wound from the angle of the eyelids and no scarring or distortion of the eyelids.

**X-ray Treatment.** The use of the *X-ray in the treatment of malignant tumors* is applicable in a minor degree to these neoplasms in the ocular tissues. Tuberculosis of the lids as well as other malign growths in the palpebral skin have been successfully treated, especial care being taken to avoid injury to the globe. Retrobulbar tumors are not, so far, accessible to this form of treatment. The Editor, in August, 1902, referred a recurrent glioma of the orbit, after an enucleation of the eyeball followed by a complete exenteration of the orbit had been done by him, to W. A. Pusey of Chicago. The secondary masses filled the cavity and could be plainly seen and felt. The lacrimal gland was involved. Treatment by the X-rays, although it failed to cure the case, kept the growth in abeyance for four months. The usual protrusion of the tumor did not follow its appearance at the palpebral aperture, the pain was much relieved and for two months there was a decided lessening of the tumor mass. The patient eventually died of a metastatic meningitis. The Editor, in view of this experience, strongly advises the use of the Roentgen ray *immediately after extirpation* of any malignant intraocular or orbital tumor, to anticipate its recurrence in the orbital tissues.

# OCULAR SYMPTOMS IN GENERAL DISEASES.

**Graves' Disease.** The question of curing or of greatly relieving the distressing symptoms of *exophthalmic goiter* by operation has been much discussed recently in various quarters. Whatever one may think of the pathogenesis of this peculiar disease[1] its relations to disturbed action of the thyroid are unquestioned and any treatment that overlooks this fact is not likely to be of permanent value. A. E. Halstead[2] sums up a pertinent paper on the surgical treatment of Graves' disease as follows: In detailing the results obtained by operations upon the cervical sympathetic, the stretching operation can be left out of consideration. The results of simple section of the sympathetic can be said to influence the exophthalmus and goiter but little, and to improve the tachycardia but slightly. Jouboulay reports six cases of unilateral and two of bilateral section. In these cases the exophthalmus disappeared, the retraction of the eye being noticeable after the first day. The goiter was somewhat diminished in size, though the number of pulse beats per minute was not noticeably diminished; the heart, as a rule, became more regular in its action and the patient complained less of palpitation. One patient four years after operation could work twelve hours a day in a factory, while previous to operation she was bedridden.

The results as regards partial resection of the cervical sympathetic, including both unilateral and bilateral resections, are, on the whole, more favorable than those of simple section. Balascescu reports 27 carefully observed cases which were treated by partial resection. These cases had been watched for from one to four years. Of these, 9 were cured, 11 greatly improved, and 2 unimproved; there were 5 deaths, but none could be attributed to the operation. The same author reports 17 cases of total bilateral resection of the sympathetic, 14 of which were Jouboulay's. Of these, ten, or 58.9 per cent, recovered completely, the exophthalmus disappearing not later than the second day; improvement in the tachycardia was more gradual. In

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(1) See article by the Editor in the Buffalo Med. Journal, January, 1902.

(2) Medicine, September, 1902.

some cases, however, the pulse would immediately drop to normal and remain there. In two cases there was a recurrence of the heart symptoms after the pulse had been normal for some time. In 5 of the 17 cases one or more of the symptoms were greatly improved, although the patient could not be said to be cured.

The value of total bilateral resection Jouboulay considers as demonstrated in these cases, in which 58.9 per cent recovered and 29.4 per cent were greatly improved. There is no doubt that the results are as good as those obtained by unilateral thyroidectomy, although the number of cases is too small to definitely place the status of this operation.

Three well marked instances of *one sided exophthalmus in Basedow's disease* are recorded by Trousseau.[1] A woman of 52, cachectic and nervous, had a rapid pulse and unilateral exophthalmus. She had been examined by several physicians, one of whom diagnosed orbital cancer. Two years later the diagnosis of Basedow's disease was self evident, although the ocular condition remained unilateral. The second case was that of a woman aged 56 years. Signs of the disease were marked and there was a unilateral exophthalmus with corneal ulceration. The third was that of a patient with unilateral exophthalmus in which it was claimed the disease had appeared first on the left side, to pass away, and appear on the right side.

As a supplement to the foregoing Jean Terson[2] remarks that some writers express doubt of the existence of unilateral symptoms in Graves' disease. He consequently gives the following histories and conclusions: A woman, 60 years old, unmarried, for three months complained of a feeling of weight and discomfort in the right eye, the vision of which was normal. The fellow eye did not exhibit any change. Examination of the right side revealed the presence of the von Graefe and Stellwag signs. The pulse-rate was 150 and there was a slight tremor of the upper extremities. The patient was excitable, and there was slight enlargement of the right lobe of the thyroid gland. She had always been nervous, but the present complaint had developed after some painful domestic troubles. A second case was in a married woman, aged 33, who com-

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(1) La Clinique Ophtalmologique, April 10, 1902.
(2) La Clinique Ophtalmologique, March 25, 1902.

plained of a variable prominence of the left eye. The right eye had never given her any trouble. She attributed her condition to worry. Examination showed an exophthalmus with the presence of the von Graefe and Stellwag signs, together with a diplopia, which was referable to a paralysis of the superior oblique muscle. At the first visit the pulse-rate equaled 86, but at a later visit it was 102. There was slight hypertrophy of the thyroid gland. The third case was seen in a man, aged 48, who was obliged to discontinue work on account of cardiac palpitation. Examination showed a slight exophthalmus on the right side, with retraction of the upper eyelid. The pulse-rate ranged between 110 and 120, and, although goiter was absent, the diagnosis of Graves' disease was made. Until his death, some twelve years later, there was, practically, no change in his condition.

The author believes that various orbital tumors and inflammations may simulate the exophthalmus of Graves' disease, but he thinks that, in any case in which the Stellwag or the von Graefe sign is present, the disease should be suspected. He considers the best treatment to be the prolonged employment of 40 to 60 grains, daily, of salicylate of sodium.

**Fundus Changes in Mastoid Disease.** A large number of fundus examinations were made by Hansen[1] of patients suffering from the cerebral complications of mastoid disease and other deep seated ear lesions. In 11 cases of uncomplicated extradural abscess there were 3 cases in which there were slight fundus changes. In 30 cases of purulent meningitis 15 showed ophthalmoscopic changes, and of these 33 per cent had choked disc. In 4 cases of tubercular meningitis there were, twice, marked changes in the fundus. There was also choked disc in a case of internal hydrocephalus. In 8 cases of endocranial complications 7 showed ophthalmoscopic changes. In 8 cases of uncomplicated sinus thrombosis fundus changes were noted 3 times and in one of these there was choked disc. In 21 cases of complicated sinus thrombosis there were 10 cases in which ophthalmoscopic changes were found. In 12 cases of cerebral abscess ophthalmoscopic changes were noted 6 times.

**Chlorosis.** Affections of the eye in *chlorosis* are said

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(1) Wochensch. f. Ther. und Hygiene des Auges, 16, 1902.

by Geo. F. Suker[1] to be quite frequent in the male sex and are often seen after the thirtieth year. He defines the condition to be an "oligochromemia dependent upon a faulty hemopoiesis, the latter in turn being due to a deficient hemoglobingenesis. In other words, we can call it autotoxemia and the lesions in the fundus are the result of this toxemia." The various symptoms and ocular conditions either directly dependent upon or aggravated by the existence of chlorosis are described in detail. The paper closes with the following conclusions: "1. Optic atrophy, papilloretinitis, and pseudoalbuminuric spots can and do have chlorosis as their causative factor. 2. Double optic atrophy associated with chlorosis may simulate brain tumor to a marked degree. 3. Headaches due to a refractive error and asthenopia are of a severer type and are often aggravated by the chlorosis. 4. Arterial pulsation in the retina is indicative of the severity of the disease, as is also the venous pulse. 5. The fundus lesions in chlorosis are the result of an autotoxemia. 6. The prognosis in nearly every case is favorable, considering the severity of the hemic lesion, excepting in optic atrophy. 7. The foci of fatty degeneration in the retina deserve special attention, so as not to be mistaken for albuminuric spots."

**Post-Hemorrhagic Blindness.** Inasmuch as the causes of this condition have not been satisfactorily explained the paper of Assicot[2] is of interest. He reports two instances of blood loss followed by amaurosis. The first was that of a woman 40 years old, whose previous medical history was negative. For two years past she had suffered from headache, vertigo and emesis. A profuse metrorrhagia, lasting six days, developed, followed, two days later, by absolute and permanent blindness, and by a complete subsidence of all other symptoms. Five weeks after this the fundus of each eye showed the typical changes of post-neuritic atrophy. The second case was in a married woman of 44, who developed a profuse metrorrhagia, lasting eight days. Three weeks later complete and permanent blindness rapidly ensued. At that time there was discoloration of the optic papillæ, with filiform retinal arteries and slight distention of the corresponding veins. The condition at the

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(1) Medicine, May, 1902.
(2) Archives d'Ophtalmologie, May, 1902.

time of writing, three months later, was that of complete white atrophy of the optic nerves. Amaurosis following hemorrhage, the author says, occurs most generally in men and between the ages of 35 and 40 years. It most frequently follows the hematemesis of gastric ulcer. Among women, amaurosis is rare after normal labor, and usually follows an abortion or appears after metrorrhagia at the time of the menopause. The fundus lesions are included under four classes: First, no change, atrophy later; second, rapid appearance of the atrophy; third, hemorrhagic neuroretinitis as found in albuminuria; and, fourth, papillo-retinitis, terminating in marked post-neuritic atrophy. Owing to the diverse appearances, the pathogenesis cannot be limited to a single cause. Vascular spasm, endarteritis, lymphstasis and infection have all been advanced as factors in their productions. It is probable that the cause is complex, including all of the above mentioned elements.

**Measles.** E. Hertel[1] reports three cases of *ocular infection following measles.* All three patients had pulmonary complications. In one case there were corneal perforation and sloughing and both eyes had to be exenterated. In the second case perforation occurred promptly in one eye and in the other eye just before death. In the third case there was slight corneal involvement, but no marked ulcer, though there was more or less ulceration of both palpebral and bulbar conjunctiva. The cases resembled one another closely in that the pneumococcus was found in the conjunctival secretion and in both corneal and conjunctival ulcers.

**Arteriosclerosis.** The diagnosis of retinal (and probably general) *arteriosclerosis* with the ophthalmoscope is reviewed by E. Raehlmann[2] in the light of 15 cases. He regards the most important alterations as follows: A sharply circumscribed disc is usually seen; marked changes are usually noted in the veins; for example the author describes a condition where the vein is much constricted. There is apparently an interruption in the blood column and the latter is simply reduced to a thread in size. Further on the vein may become three times as large and assumes a more or less tortuous course. The arteries show aneurismal-like

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(1) Archiv für Ophthalmologie, Bd. 53, 3, 1902.
(2) Zeitschrift für Augenheilkunde, June, 1902.

dilations or varicosities and between these points the blood-vessel is a mere thread. Sometimes the arteries are very tortuous and show delicate pulsations. There is often more or less haziness about the wall of the artery. The veins are, generally speaking, dilated, and their peripheral portions, especially in the very old, are apt to be much broader than in the region of the papilla, and sometimes the veins show oval-shaped enlargements. These conditions interfere to some extent with the blood current as evidenced by the minute hemorrhages often seen in the vicinity of the constrictions. In general arterio-sclerosis the changes in the retinal vessels are usually found to an equal degree in both eyes. Endarteritis may be properly assumed as responsible for the principal features of the ophthalmoscopic picture.

**Diabetes.** The *ocular changes in glycosuria* are thus summarized by W. L. Pyle:[1] 1. Diabetes mellitus or other disturbance of the carbohydrate metabolism may affect any portion of the visual apparatus. 2. The ocular changes may be produced by chemic or physical means, or indirectly through the associated general debility. 3. The ocular affections may vary in intensity from a slight failure of accommodation to a formidable hemorrhagic retinitis and total optic nerve atrophy. Minor visual disturbances are often made worse by fatigue or increased cardiac action, and may improve after prolonged rest or decrease of vascular tension. 4. The intraocular disturbances may be exclusively unilateral, and there is never seen ophthalmoscopically, inflammation of the optic nerve—important differences from the changes in albuminuria, syphilis and other blood-dyscrasias. 5. It is not uncommon to find albuminuria coexistent with glycosuria, and the retinal changes may present a mixed picture, or a typical albuminuria retinitis may be present in a patient with diabetes. 6. Central amblyopia may exist in glycosuria entirely independent of the toxic influence of alcohol and tobacco, or in patients addicted to the habitual use of these substances, this may be the prominent factor in causation. In these cases the initial lesion may be in the ganglion cells of the retina; the inflammation of the "papillomacular fibers" of the temporal half of the optic nerve being secondary to the retinal changes. 7. In chronic cases of glycosuria, with

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(1) American Medicine, April 19, 1902.

the exception of cataract, the ocular symptoms are often present when the constitutional and urinary symptoms are not marked. 8. The ocular symptoms may be the first to lead the patient to seek medical advice. Therefore glycosuria should be suspected in the following conditions: (a) Premature presbyopia; (b) unexplained mydriasis or cycloplegia; (c) sudden change in the refraction; particularly, marked development or increase of myopia past middle age, without cataractous changes; (d) intractable iritis; (e) cataract in young or middle-aged persons; an examination of the urine is advisable even in cases of senile cataract, as the etiology has a bearing on the prognosis of operation; (f) retinitis, particularly of the hemorrhagic variety; (g) unexplained optic nerve atrophy; (h) sudden and marked amblyopia, particularly central, without visible fundus changes.

**Albuminuric Retinitis.** The prognosis has been studied in 38 cases by A. Eutener.[1] His conclusions coincide with those of other observers. The outcome is very unfavorable as death generally supervenes within one or two years, although there are occasional exceptions. Under favorable external conditions, and in women, the prognosis is better. If not existing before pregnancy a favorable prognosis as to restoration of sight and life may be given.

**Mumps.** A case of *paresis of accommodation following mumps* is reported by Bagneris.[2] The subject was 15 years old and the paralytic attack did not manifest itself until the end of the third week. There were no other ocular complications and the patient soon recovered.

## THERAPEUTICS.

**Argyrol.** A number of new remedies for the treatment of eye diseases have appeared during the past year. A few observers have also recommended new applications of old agents. Many of these have been already reviewed or referred to under the affections which they are designed to relieve or cure. One of them, in the experience of the Editor, deserves special mention, viz., *argyrol* or silver vitel-

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(1) Inaugural Diss. Giessen, 1901.
(2) La Clinique Ophtalmologique, June 10, 1902.

line. It was first described by A. C. Barnes and H. Hille.[1] This is an organic silver compound occurring in dark brown or black flakes, readily soluble in water, and may be described as intended for use where silver nitrate is indicated. Instillation into the sac of a 20 per cent solution is entirely painless and non-irritating. To the Editor it appears more active and more desirable in many respects than argentamin, nargol or protargol. In simple hyperemia of the conjunctiva the injection of the vessels, at first increased, after a few hours is lessened. It also acts well in the simple, infective conjunctividites and may eventually be found to possess most of the virtues and none of the drawbacks of silver nitrate when employed as a germicide in the severe forms of conjunctivitis. A recent article by A. Alt[2] also speaks favorably of its use in conjunctival infections.

**Serum.** The uses to which the *Marmorek's serum* can be put in ocular therapy are exhaustively treated by S. Attantasio.[3] As is well known, Marmorek (Pasteur Institute, 1894-5) succeeded in obtaining a serum not only preventive but curative of pyogenic streptococcus infections and valuable observations were made with it in erysipelas, scarlatina, puerperal fever, phlegmon, etc. Attantasio concludes as follows: "Marmorek's serum has a marked therapeutic effect in many inflammatory processes, both intra- and extra-ocular. It has a special preventive action on post-operative infection. When the latter is to be feared injections should be made before operation and continued till a cure is established. The serum has a marked and immediate action of a sedative nature on the pain of inflammation. It seems to accelerate the healings of the operative incision. It is absolutely harmless; it produces no albuminuria and has no injurious nervous effects, even when used for a long time in large doses. It produces no cutaneous irritation at the site of injection, or on any other part. To get the best effects of the serum it is necessary to use it in the beginning of the inflammatory process, and in large doses. The later it is used, the less is the probability of success.

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(1) Medical Record, May 24, 1902.

(2) Am. Journal of Ophthalmology, October, 1902.

(3) Archivio di Ottalmologia, ix., 1902.

**Citrate of Copper** as a substitute for silver nitrate is recommended by F. R. von Arlt.[1] He uses the agent in the form of a salve, 5 to 10 per cent, mixed with glycerin and starch. It is applied on the end of a glass rod and is rubbed into the conjunctival sac. The lids are then closed and massage is employed for about half a minute. The pain is slight and transient. The treatment should be repeated two or three times daily. It is a great advantage that the patients can employ the treatment themselves. He refers to three cases of pannus in which the trouble disappeared in from 7 to 12 days. It is to be avoided in corneal ulcers and also when the individual is taking iodid of potash.

**Jequiritol** is extolled by Hummelsheim[2] as possessing all the advantages of jequirity. It is preferable to the latter in that it is possible to use a definite dose and at the same time avoid the infliction of permanent injury to the eye. [For additional remarks on the recent revival of this old remedy see the heading "Trachoma."—Ed.]

**Dionin,** according to Luniewski,[3] depends for its action upon the free flow of blood plasma in the stroma so that a certain amount of pressure is exerted upon the yielding walls of the veins. We have, as a result of this, venous stasis and an acceleration of the lymph circulation throughout the eyeball. The pressure which is exerted upon the veins is also exerted upon the nerves, and we have a certain amount of paresis, which explains the analgesic effect. The drug, then, is indicated when we want to bring about a quick resorption of either inflammatory products or of serous exudates. It is also indicated when we wish to get prolonged anesthesia of the eye. It is contraindicated in old people with arterio-sclerosis. He calls attention to the frequency of sneezing after the use of dionin, a result which depends upon the degree of patulency of the canaliculi and upon the peculiar susceptibility of the nasal mucous membrane. Contrary to the views of Darier and others, the author finds that the pupil is made smaller by the instillation of dionin. He has noticed that dionin acts most favorably in retinal detach-

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(1) Centralblatt für pkt. Augenheilkunde, May, 1902.
(2) Zeitschrift für Augenheilkunde, April, 1902.
(3) Die Heilkunde, 2, 1902.

ment due to serous effusion. [In both iritis and acute glaucoma the Editor finds not only relief from pain when a 5 per cent solution of dionin is freely used, but he is convinced that the favorable action of other local remedies is greatly enhanced thereby.]

Darier[1] has employed *dionin* in various forms of keratitis, iritis and glaucoma. He believes that in this drug we have the most important recent addition to our therapeutic agents. It is a derivative of morphin and acts both centrally and locally. Introduced into the subconjunctival tissues, it acts as a marked sedative through the periocular lymph spaces, this effect not being produced by its absorption elsewhere. Locally, upon the conjunctiva, it serves as an analgesic, an antiseptic, and a lymphagogue with very feeble local anesthetic powers. To its derivative action as a lymphagogue may be attributed the permanency of its powers upon inflammatory states and its efficiency in hastening the absorption of the postoperative débris of cataract. The author concludes that the drug should be employed to quiet pain in all cases in which local anesthetics are futile; to hasten absorption of pupillary exudates; and to favor mydriasis. By preference, he has employed it in solutions of 2 per cent strength, from which no toxic effects have been reported.

**Cuprol,** an organic combination of copper and nucleinic acid, contains about 6 per cent of metallic copper and is readily soluble in water. Von Sicherer[2] says of it that in solutions containing albumen no coagulation is seen on the addition of cuprol. The 10 per cent solution is generally used, to which it is well to add $\frac{1}{2}$ per cent of chloretone. It is best to make the solution in warm water. With a solution of this strength there is practically no pain when dropped into the eye and there is the minimum amount of irritation to the conjunctiva. Sometimes, after 10 or 15 minutes, a slight burning may be felt, but this is only transient. In acute and chronic conjunctivitis the use of cuprol will usually be followed by a rapid disappearance of the redness and secretion. It is also valuable in phlyctenular conjunctivitis and in cases of chronic conjunctivitis where other remedies fail. In phlyctenular con-

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(1) Clinique Ophtalmol., Jan. 10, 1902.
(2) Ophthalmol. Klinik, December, 1901.

junctivitis one can employ either the solution or the powder. Simeon Snell has found that cuprol penetrates more deeply into the tissues than the other copper salts, and hence he suggests its probable value in trachoma. The chief advantages, then, of the agent are its relatively slight irritating properties and its greater powers of penetration.

**Trikresol** (1 to 1,000 in water) is regarded by Edward Jackson[1] as an ideal antiseptic application and base for collyria. This agent was first recommended by E. A. de Schweinitz in 1894. Its instillation causes at first a very slight sensation of burning. He has used it as a basis for solutions of cocain, eserin, most of the mydriatics, and even boric solution in some cases; but not for solutions of homatropin or atropin, when repeated instillations are required, since even the slight sensation and increased lacrimation are objectionable. He has found that a solution of 1 to 1,000 is free from the risk of making the eye worse in any respect, is an antiseptic solution that will at least keep itself clean, and that it has a distinctly germicidal influence when used to wash out the conjunctiva. Although the solution of 1 in 1,000 has a very noticeable smell of trikresol, this does not remain about the patient on whom it has been used. It seems superior to carbolic solutions to lay instruments in, to keep them from contamination after cleansing. It is also superior to formaldehyde solutions, for this purpose, because it is not necessary to rinse the instrument coming from it in something else before using it upon the eye.

**Atroscin** and (iota) *I—scopolamin* are regarded by Walter F. Macklin[2] as identical cycloplegics. The former is a pure crystalline base found in the scopolamin (hyoscin) of commerce. He advises their use as a 1 per cent solution in castor oil, and says they act as rapid and powerful mydriatics, and, as cycloplegics, are as potent and reliable as atropin sulphate, while the power of accommodation returns in five days. Of course, with homatropin this power returns in 24 hours, which is undoubtedly a great advantage in many cases, yet homatropin has disadvantages which must be apparent to all who use it, notably the fact that it never does completely overcome accommoda-

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(1) Ophthalmic Review, June, 1902.
(2) Archives of Ophthalmology, March, 1902.

tion, but leaves it in an uncertain and indefinite condition of unstable equilibrium—at one moment giving one result and later quite a different one—always leaving an element of doubt as to whether a correct conclusion has been arrived at or not. [On the other hand this uncertainty is removed by using it in disc form combined with cocain.—Ed.]

Such doubt never exists after the use of atroscin or I—scopolamin.

Tables are presented which show the results of the action of scopolamin and atroscin. These show that mydriasis begins in ten minutes and is complete in twenty. Cycloplegia begins in ten minutes and is complete in about fifty (average). The power of accommodation returns to normal in five days (with occasional slight variations). These drugs, in the hands of the writer, never fail to give satisfactory results, and he believes they ought *always* to be used in preference to homatropin in school children and all other persons with active accommodation, who can possibly afford the necessary five days' time.

**Cocain.** C. R. Holmes does not believe that *cocain solutions* become inert after sterilization, and says that he has not used any cocain solution for twelve years that has not been sterilized by boiling, and has used it upon operations upon the eye, ear and nose thousands of times. In his experience it is the rarest thing to find that the drug is not efficacious, and in these rare cases he has attributed its lack of action to the idiosyncrasy of the patient.

**Iodipin.** Von Hymmen[1] remarks on the discomforts which often accompany the employment of large doses of potassium iodid, and hence recommends *iodipin,* a combination of the oil of sesame and iodin. The drug is well borne, even for long periods of time. The elimination is very slow, traces of it remaining in the urine 53 days after administration. It may be given by mouth in 10 per cent strength, six teaspoonfuls a day, or as the oil inclosed in capsules. It may be also employed hypodermatically in 10 to 15 cg. doses of 25 per cent solution every two or three days. It can be also administered by inunction. Iodipin, he says, can be given for all the conditions for which iodid of potassium has been used. He states that it repeatedly

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(1) La Clinique Ophtal., Jan. 10, 1902.

succeeded in cases in which the latter drug had failed, not only in syphilitic affections but in tumors and chronic inflammatory exudates, ocular palsies, etc.

[Since the introduction of the plan of administering them in large quantities of water (one to two pints) and especially in conjunction with the sweat bath, the ingestion of extreme and continued doses of the iodids has been robbed of most of its objections and iodism is rarely encountered.—Ed.]

Naegeli[1] has also made a number of experiments with *iodipin.* The drug may be administered either by mouth or subcutaneously, and therefore should be effective as an absorbent when injected beneath the conjunctiva in place of sodium chlorid. After subconjunctival injections in the rabbit, he was able to recover from ½ to 2 per cent of the iodin from the tissues of the eyeball, whereas after the insertion of iodoform beneath the conjunctiva, only a trace of iodin could be found in the eye. In an eye in which iritis had been produced by the injection of a sterilized culture of diplococcus in bouillon, the subconjunctival injection of iodipin caused a rapid absorption of the hypopyon. Iodipin has no germicidal action on bacteria in artificial cultures, and probably will be of no value as an antiseptic, but Naegeli believes that it will be a valuable drug to promote absorption of pathologic exudate. The injections are practically painless and cause no local injection. He has tried it in eight cases in man, injecting 0.2 to 0.3 grm. of a 10 per cent solution every third to eighth day, according to the rapidity of action desired. In two cases of scleritis, one of keratitis dendritica, one of keratitis neuroparalytica, one of choroiditis and one of neuro-retinitis, he obtained very rapid improvement, but in one of vitreous hemorrhage there was apparently no change. The cases were few in number, but he believed the results achieved warrant a further trial of the remedy.

**Subconjunctival Injections.** Pflueger[2] strongly advocates *subconjunctival injections of iodin and chlorid of sodium* and employs regularly such injections in progressive myopia, chronic choroiditis, and in vitreous opacities. The investigations of Landerer with intravenous and in-

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(1) Archiv f. Augenheilk. Erganzungsheft, 1901.
(2) Klin. Monatsbl. für Augenheilk., October, 1901.

tramuscular *injections of hetol* led Pflueger to try the agent in some of the more chronic affections. He has used the injections especially in herpes corneæ of which we have keratitis dendritica as a conspicuous example, also in deep ulcer of the cornea and in various forms of uveitis. He has also tried the agent in parenchymatous keratitis and in relapsing scleritis. The injection of hetol to use his own words "exceeded all expectations." He injects every two days 0.1—0.5 c. cg. of a 1 per cent hetol solution.

Arthur H. Benson[1] gives the results of a number of practical *tests with sodic and potassic fluorescein,* the solutions of both exhibiting intense yellow-green fluorescence. He concludes that when a cornea stains in whole or in part, the stained part represents either (1) an ulcer not yet covered with epithelium; or (2) an abrasion of epithelium; or (3) epithelium in a dead or diseased condition, though not necessarily in a dying state. The fact of staining is not therefore to be in all cases taken as an indication for active treatment, though such is often taught, for in many cases an ulcer which stains is nevertheless healing quite satisfactorily, and the fact of the epithelium taking on the stain is not an indication that an ulcer will certainly form.

[The Editor is convinced, after trials of the various preparations of fluorescein, that a 2 per cent solution of potassic fluorescide, dropped on the cornea without the preliminary use of cocain and after gentle cleansing of the parts with sterile water or a borated solution, forms the best method of employing this valuable reagent. The test is further robbed of its objections if the patient closes his eyes for a few minutes after the instillation and all superfluous stain be then washed off by flooding the eye with sterile water.]

*Hypodermic injections of benzoate of mercury* are strongly recommended by Armaignac[2] in preference to all the other mercurials. This method with the benzoate is neither painful nor followed by disagreeable symptoms. In specific cases the results have equaled those that have been obtained by the use of the other salts. Of their use in non-specific cases he is non-committal. The salt is employed in the following solution: Benzoate of mercury, 1 gram; benzoate of ammonia, 3 grams, with 100 grams of distilled, sterilized water.

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(1) Ophthalmic Review, May, 1902.
(2) Recueil d'Ophtalmologie, March, 1902.

De Wecker[1] finds *subconjunctival injections of gelatin* of value in some ocular affections. Noting the remarkable results of gelatin injections in aneurisms of the aorta he has been led to employ the same material, either alone or in combination with 3 to 5 per cent solutions of chlorid of sodium, subconjunctivally instead of the painful injections of 10 to 20 per cent solutions of salt. He speaks encouragingly of this method of modifying the osmotic currents more particularly in cases of intraocular hemorrhage. The author has found that the injections are painless and that they are not followed by any reaction if properly sterilized solutions of isinglass (not bone gelatin) are used. He states, however, that if these conditions cannot be fulfilled, it is far preferable to employ simple chlorid of sodium solutions which are easily rendered aseptic.

## NEW INSTRUMENTS AND APPLIANCES.

**Ophthalmoscopes.** Although a number of useful appliances have been added to the ophthalmologist's armamentarium during the past year, few of them are of value equal to the electric self-illuminating ophthalmoscope. The first model was that of Hugo Wolf,[2] but this instrument (very expensive to Americans) has since its introduction been much improved upon both as to lightness, portability and price by a number of domestic instrument makers. Chambers, Inskeep & Co., Chicago, now make such an ophthalmoscope and with it a small portable battery especially and admirably adapted for bedside examinations of the fundus and for use in any emergency where a special dark room and a properly placed source of illumination are not readily obtainable. Armed with such an ophthalmoscope the fundus can be examined while the patient lies prone in bed—often a serious consideration with the old instruments.

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(1) Clinique Ophtal., November, 1901.
(2) Pract. Med. Series, Vol. III. page 123.

G. F. Suker[1] also points out other advantages of this valuable instrument.

One can, without the use of a mydriatic, examine the fundus in detail with great ease. It matters little how small the pupillary diameter is, a view of the fundus is readily obtained. It is exceedingly convenient in examining the eyes of children and unruly patients, as the light is always on the eye, thus easily following the movements of the head. The source of light (a 2-candle power electric lamp, from a 4 volt battery) being very close to the eye under examination, there is but little waste of the intensity of light. The heat generated by the lamp is not sufficient

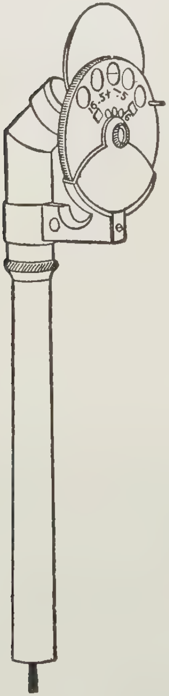
Fig. 17. Self-illuminating ophthalmoscope.

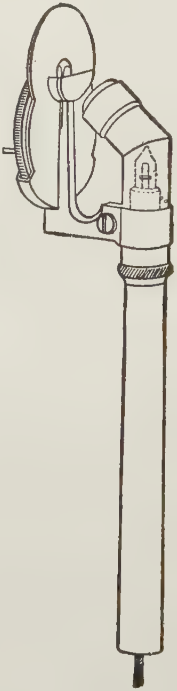
Fig. 18. Self-illuminating ophthalmoscope.

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[1] Chicago Medical Record, Oct. 15, 1902.

to interfere in any way with the comfort of the patient. The fact that the light can be brought so close to the eye under examination accounts for the excellent fundus illumination, there being but little expenditure of intensity of light after the reflection. The light is reflected from a plane mirror; the latter is placed within the focus of the condensing lens, which is 80 dioptres in strength. The rays, therefore, are reflected parallel and the focus of light is obtained after the reflection. For this reason, the focus is brought very nearly into the anterior chamber if the cornea is not too sharply curved. Otherwise, it is brought almost directly on the cornea.

Because of these conditions a large field of illuminated fundus and a power of light penetration are obtained which can scarcely be had by any other method of ophthalmoscopy. Therefore, an exact interpretation of the fundus conditions can be elicited. The intensity of the illumination can be nicely controlled by the requisite switch on the battery. Such opacities in the ocular media as are made nearly transparent or translucent by the intense light can be easily located with the weaker light.

Another *ophthalmoscope especially designed for teaching purposes* is the stationary instrument invented by Dr. Walter Thorner of Berlin. H. F. Hansell[1] gives a favorable report of its use although he believes it will never replace the hand scope because of its size, its small value as an instrument for the approximate measurement of the refraction, its non-portability and inferiority in studying the lens and vitreous opacities. Still he believes the instrument will greatly aid the ophthalmologist in his study of minute changes in the fundus and he also thinks the student and general practitioner will learn the use of the stationary instrument more easily than he will the hand ophthalmoscope. In teaching one is able to demonstrate to a student, physician, or other person, satisfactorily and rapidly, the fundus of a patient whose pupil is dilated. On several occasions he has shown to 25 or 30 students of the graduating class of Jefferson College—men entirely unacquainted with any ophthalmoscope or fundus picture, except as book illustrations—in one hour or less, every detail of the eyegrounds of several patients, without difficulty

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(1) American Medicine, Feb. 1, 1902.

and without uncertainty. In sketching or painting healthy or diseased eyegrounds, the artist's hands are free to hold the pencil or brush, and no time is lost in laying down and picking up the ophthalmoscope or in searching for the part of the fundus previously portrayed in order to make a complete picture. Moreover, moderate illumination of the room is no disadvantage. The skilful artist, without strain on his imagination, *must* make a true-to-life picture as readily as he would copy a slide under the microscope.

In diagnosis a comparatively large part of the fundus is held under examination at one time. For example, the field includes the papilla, the fovea and the regions between and adjacent to both; or by altering the direction of the gaze of the other eye to objects in different parts of the room as they are seen through small mirrors fixed on the instrument, all sections of the fundus are successively seen. Hence, the relative size and the distance apart, as well as the exact position of all the factors that make up the picture of the fundus, are noted. Since the magnification is that of the direct method, and the illumination by the small oil lamp is all that could be desired, no lesion, however small or faint, visible with the hand ophthalmoscope, can escape observation and others heretofore invisible are brought plainly into view. These pictures have forced him to modify to a certain extent his conception of the state of the retina and choroid in health and in some diseases.

**Massage Instrument.** Massage by air-water suction is applied by means of an instrument devised by Kauffmann.[1] It consists of a suction air-pump, resembling a syringe, which fits snugly into a cup, the latter being applied closely to the orbital margins. A to and fro movement is produced, which is regulated at the will of the operator. When water massage is applied the little cup which lies next to the eye is half filled with water, of any desired temperature, and the force is communicated to the eye through the water. The sittings should last from three to eight minutes and should be repeated once daily. Inasmuch as the method makes decided traction upon the eyeball it is suggested by the author that it is especially applicable to embolus of the central artery and to optic nerve troubles; also to paresis

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(1) Wochensch. f. Ther. und Hygiene des Auges, 22, 1902.

of the motor muscles. In all cases where subconjunctival injections seem indicated the air-water massage is valuable.

**Glasses for Aniridia.** Königshöfer[1] describes glasses for eyes that have been deprived of the iris. These are fitted with an iris diaphragm by means of which the amount of light entering the eyes may be controlled, thus avoiding the difficulties that are incident to sudden changes in the amount of illumination.

Landolt[2] uses a *cystitome* with a blade much larger than the Graefe instrument. The size of the blade permits of it being sharpened and thus renders the instrument more efficient for the laceration of tough capsules.

**Enucleation Forceps.** A new design is figured by G. F. Suker.[3] When an operator wishes to preserve an eye intact for pathologic section or examination, he experiences more or less difficulty when the globe is staphylomatous or the cornea threatened with perforation or rupture.

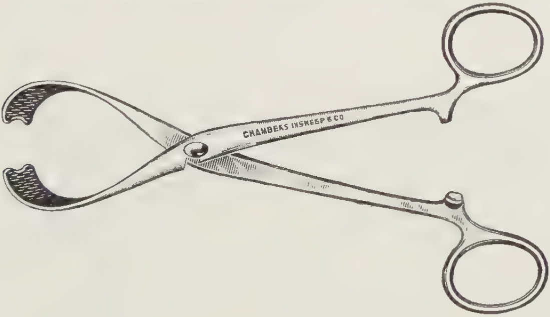

Fig. 19. Suker's enucleating forceps.

Again, the removal of a collapsed globe is by no means an easy task.

This forceps, intended to remove these difficulties, is modeled after the usual obstetrical forceps and is applied in a similar manner. After having cut the conjunctiva, severed the muscles and opened Tenon's capsule, insert the pivot blade well into the capsule cavity, following the curve of the globe, and holding it parallel to the long axis of the globe; next, pass the blade with the slot in a similar man-

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(1) Clinique Ophtal., October, 1901.
(2) Archives d'Ophtalmologie, February, 1902.
(3) Ophthalmic Record, January, 1902.

ner on the opposite side of globe and lock the blades as on ordinary catch forceps. The globe is now securely held between the blades, and the optic nerve very likely extends through the notch. One can now exert considerable traction without fear of injuring the globe. Use the usual curved enucleation scissors to sever the nerve and surrounding tissues.

The blades are sufficiently concave, curved on the flat, and large enough to firmly hold and encircle the globe, and when locked are unable to exert undue pressure upon the globe. The dimensions of the forceps are such as to meet with the usual requirements as to size of the eye ball in enucleations of this character.

**Tendon Tucker.** A new *tendon tucker* is presented by F. C. Todd.[1] In the figures, A shows the instrument before

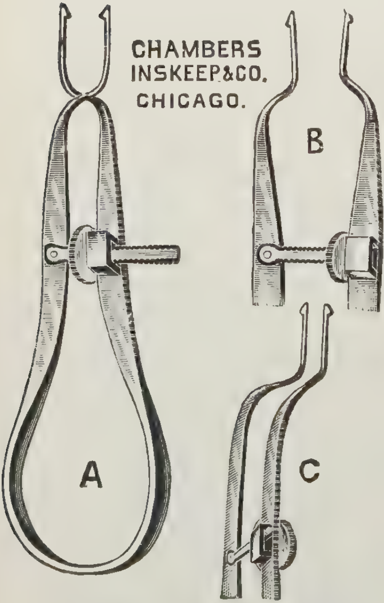

Fig. 20. Todd's tendon tucker.

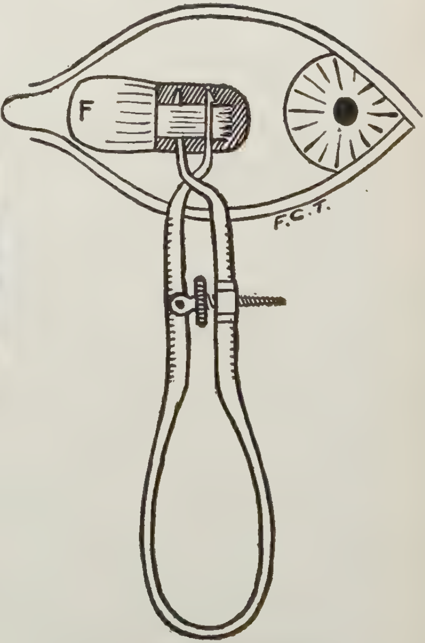

Fig. 21. Todd's tendon tucker applied.

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(1) Ophthalmic Record, February, 1902.

introduction and B when the prongs are separated by the set screw and C shows a side perspective. It will be seen that this instrument is so made that the bulk of the instrument extends down on the cheek, where it rests out of the way of the operator, further that one prong is introduced under the tendon when the prongs are crossed, but when the tuck has been taken the prongs are separated, as shown in Fig. 20, and so do not interfere with the introduction of sutures. At the ends of the prongs there is a smooth hook which prevents the tendon from slipping off during the operation. The instrument is universal, *i. e.,* can be used on the external or internal rectus of either eye.

[The Editor has employed this little instrument and believes it to be valuable where the tucking operation is indicated.]

**Eye-glasses.** A new form of *saddle-bridge eye-glasses* is described by Jackson.[1] As shown in the accompanying figure, the two lenses are connected by a rigid saddle-bridge, as in ordinary spectacle frames. The frame is kept on the face by a pair of spring clips, one attached to each end of the bridge. Each of these is pressed against the nose, by the action of its separate spiral spring. Attached to each clip is a projection, pressure upon which releases its hold upon the nose, when the glasses are to be put on or removed.

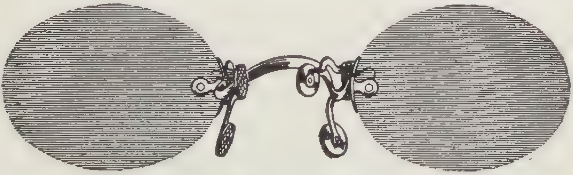

Fig. 22. Jackson's saddle bridge eye-glasses.

**Phorometer.** A *simple phorometer* has been invented by F. C. Riley.[2] He imitates the Maddox rod by filling a homeopathic medicine vial with a red colored liquid. The vial should be surrounded by paper, upon both sides of which an opening has been left. These openings must be opposite each other. The patient is now seated before a

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(1) Ophthalmic Record, 1902.
(2) The Medical Record, March 22, 1902.

lighted candle, placed on a level with his eyes, distant twenty feet or thereabouts. Hold the vial containing the red liquid in front of his eye, perpendicularly, and he will see a red band of light; the distorted image of the candle flame, due to the cylindrical shape of the vial, passing horizontally to and fro as the vial is moved laterally. If the vial be held in front of the right eye, he sees a red band with the right, and the yellow white light of the candle with his left eye.

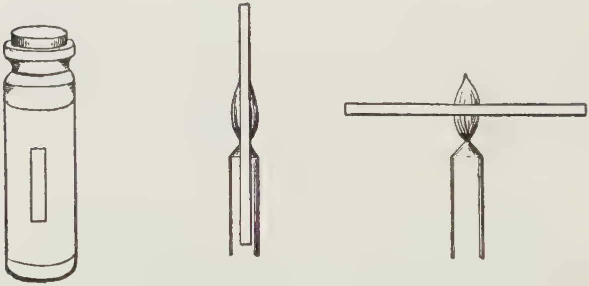

Fig. 23. Riley's phorometer.

**Kinescope.** A new method of determining the ocular *refraction* by means of an instrument called the *kinescope* is described by Holt[1] of Christiana. Its value depends upon the observance of a fixed object seen through a slit in a moving disk—just as in the child's toy called the kinetoscope. When the object has an apparent movement in a direction opposite to the disk motion hyperopia is present—in the same direction, myopia. The amount of the error is measured by the lens required to render the object motionless. In astigmatism, the author first estimates the angles with a Javal-Schiötz ophthalmometer, then with the kinescope he determines the error of each meridian. The instrument consists of a firmly mounted revolving disk. In its circumference there are perforations fitted with lenses of various strengths. On a cross arm situated on the posterior surface of the standard, a truncated cone with a stenopaic slit in the apex, is attached. This arm can be rotated to each side of the disk so that either the right or the

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(1) Annales d'Oculistique, April, 1902.

left eye can be tested. As a fixation-object, the author employs a standard supporting a black disk of 30 cm. in diameter, on one face of which a white disk of 5 to 10 cm. diameter is centered. On the other face of the disk there is a revolving white linear-index whose inclination can be determined by numbers on the disk-circumference. By means of this any angle corresponding with that of the stenopaic slit can be obtained. In the inventor's hands the method has proven efficient in determining the correction of malingerers, and in one case of secondary cataract it was the only plan that was available, the results being sustained after operative procedure. The method is somewhat similar in principle to that of the fundus-reflex test, the amplitude and rapidity of the movements however being directly proportional to the amount of ametropia.

# THE EAR.

# THE EAR.

## PHYSIOLOGY.

The manner in which sound waves are transmitted to the labyrinth and the function of the promontory and the oval and round windows continue to receive attention. The Helmholtz theory that sound waves are carried from the drum membrane through the ossicular chain to the oval window and that the round window acts as a sort of pressure regulator is frequently called in question, but as yet no theory has been brought forward which so satisfactorily elucidates some of the difficult problems relating to the act of hearing. The relation which the windows and the promontory bear to hearing, especially in the absence of the drum membrane, is considered by Lucae,[1] who believes that when the function of the ossicular chain is destroyed the sound waves entering the middle ear are transmitted to the labyrinth through both the windows and the bony promontory and that within the labyrinth the waves from the two sources produce an interference which has the effect of diminishing the perception of sound. The fact that a pledget of cotton placed against the promontory, without covering the round window, frequently improves the hearing, is accounted for by the theory that when the cotton is placed against the promontory it no longer transmits the waves; the interference consequently ceases and the hearing is improved. While this theory regarding improved hearing resulting from the pledget of cotton and the use of some of the so-called artificial drums is new, at least to the Editor, it seems very plausible. Experiments in one case, the results of which seem to verify this theory, were conducted by the Editor. The greater part of the membrane being absent the oval window was clearly visible. When a pledget of cotton covered with vaselin was held against the promontory with an applicator, the hearing was decidedly improved. When the cotton was made to cover the niche of the oval window, hearing was materially reduced. The improvement when the cotton was held against the promontory could not be accounted for by the prevalent theory that such substances increase the transmission of sound waves through the promontory.

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[1] Arch. für Ohrenheilk., Vol. lvi., p. 268.

Strohmeyer[1] has examined the brain of a deaf mute in the effort to locate the *hearing center.* From his findings with the microscope, he is inclined to believe that the hearing area is situated in the first and second temporal convolutions. The first convolution seems to be the primary center, while the second convolution bears only an associated relation to the act of hearing.

## AURICLE.

**Anomalies.** E. C. Baber[2] reports a case of malformation of the auricle with asymmetry of the Eustachian tube. The left ear was rudimentary, consisting of an elongated roll, the lower part of which was soft to the touch. The upper part contained cartilage. There was no distinct meatus, but several small depressions. Into one of the depressions a probe could be passed one-fourth of an inch. Examination with the rhinoscopic mirror showed the right Eustachian cushion distinctly smaller than the left, the depressions in the Eustachian meatus being smaller and less marked.

E. Donaldson[3] has noticed *reflex movements* of the auricle. His attention was first called to the subject by the involuntary movement of a patient's ear when powder was blown into the canal. At each puff of air the auricle was seen to move distinctly forward about an eighth of an inch. The movement was easily felt by the patient, but could not be prevented. Donaldson has experimented with a considerable number of normal ears and finds decided reflex movements in most of them. Of the various stimuli tried, puffs of air produce the most marked reflex movements. Frequently the movement is upward and backward.

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(1) Monat. für Psychiatrie Neurologie, 1901.
(2) Jour. Laryngology, Rhinology and Otology, May, 1902.
(3) Lancet, Aug. 23, 1902.

**Neoplasms.** L. Lichtwitz[1] reports the cure of *lupus* of the auricle by the application of superheated air. He finds 80° C. sufficient and 120 to 130 degrees need never be surpassed. The application is not painful.

T. R. Pooley[2] reports a case of *epithelioma* of the ear with recurrence and second operation. At the time of the first operation the growth, which was nodular in character, was situated in the upper part of the helix, just about the region of the antihelix. Extending downward, from the lower part of the growth there was a whitish reticular tissue, somewhat similar to cicatricial tissue, involving respectively the concha, tragus and antitragus, and extending into the auditory meatus. The tumor was half an inch in length by three quarters of an inch in width.

The patient being etherized, a transverse incision was made along the upper margin of the growth, then two vertical ones on either side, and all the suspicious tissues carefully dissected out. At one place in the meatus, where the growth seemed to invade the deeper structure of the auditory canal, it was scraped out with a sharp spoon, as was also some of the cartilage of the concha. In this dissection a considerable amount of the cutis of the helix, the tragus, and the antitragus was excised. The upper part of the auricle was then drawn forward by a continuous suture, and the lower part by two interrupted sutures, thus decreasing considerably the size of the wound resulting from the gaping of the incisions. Healing was rapid and the patient left the hospital after one week. Three and a half months later he returned with a recurrence, which is described as follows: A nodule about the size of a pea, ½ in. in front of the tragus, a deep erosion at the posterior and outer part of the auditory canal, about ½ in. square and extending for some distance into the canal. Another deep ulcer ¼ in. wide at the junction of the lobule with the cheek. An operation the same day consisted first in circumscribing with a scalpel all of the diseased tissue of the auditory meatus, then by means of scalpel and strong scissors removing it, after which by means of a sharp spoon all suspicious tissue was carefully scraped away until in some parts of the anterior wall of the canal the periosteum

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(1) Gaz. hebd. de Bordeaux, February, 1902.
(2) New York Med. Jour., July 26, 1902.

was removed down to the bone. The small growth in front of the tragus was then excised, as was also the deep ulcer in the cleft of the lobule. Finally, the wounds left by the incision of the growth in front of the tragus and in the lobule were drawn together by sutures, the meatus packed with sterilized cotton, the wound covered with iodoform gauze, and cotton, and a firm roller bandage applied. Healing was again rapid with prospects good for final recovery.

In Pooley's judgment the proper and only treatment for epithelioma of the auricle is excision of all the growth well into the healthy tissue, whenever this is possible. This may at times be impossible, however, and then we must resort to its destruction with lunar caustic, zinc paste, the application of fuming nitric acid, the electric cautery and the like, or the use of the toxins and X-rays. All such measures are, however, unsurgical and unreliable, and give place to the knife, scissors, sharp spoon, or other surgical methods whenever possible.

F. Alexander[1] has made a *histologic study of tumors* of the auricle and reports fifteen cases which have come under his observation. He classifies them according to their microscopic structure as; (1) connective tissue tumors, (2) epithelial tumors. Among the connective tissue tumors he finds cases of fibroma, angioma cavernosum, and endothelioma. Among the epithelial tumors he finds cases of carcinoma of the skin and glandular structure, and atheroma. He reports two cases of cheloid, one of the helix, the other of the lobule, as follows:

Case 1. Cheloid of the helix. Male, 18 years of age. A tumor the size of a pea, with smooth surface, was situated on the crura of the helix close to the scaphoid fossa of the right ear. The growth had developed slowly at the site of a scar, the result of a lacerated wound of the concha received a year previously.

Microscopically normal epidermal covering was seen surrounding a mass composed entirely of dense fibrillar connective tissue irregularly arranged containing but few spindle-shaped cells. This growth, a dense fibroma of the skin, should on account of its origin from scar tissue be regarded as a cheloid.

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(1) Archives of Otology, October, 1902.

Cheloids of the auricle are rather common, occurring in nearly all cases on the lobule following perforations for the wearing of ear ornaments. No other case was found in literature where the growth sprang from other portions of the pinna, and where there was a history of injury at the point of origin.

Case 2. Cheloid of the lobule. A female who four years previously had her ears pierced, with resulting suppuration, gradually developed a small tumor on each lobule. In three years the left one had attained the size of a hazel-nut, the right one the size of a pea. Both were excised. They were firm, had a smooth surface due to a normal but thin covering of epidermis. The mass itself was composed of interlacing fibers of connective tissue, with few spindle-shaped cells. Some of the fibers could be traced to the surrounding skin running between the epidermis and corium.

The following case of flat-celled carcinoma is given: A woman of 65 years complained of having had a sore place behind her left concha for about 6 months. She presented an ulcerated moist area extending over the lower half of the posterior surface of the concha, reaching from the helix to the integument over the mastoid process. The growth was but slightly raised above the surface. It was thickened at its edges. The thinner central portion was ulcerated and covered by a yellowish secretion. The diseased area covered about 2½ inches in one direction and two inches in the other. In front and a little below the ear there was an enlarged lymphatic gland about the size of a hickory-nut. The diseased area was removed by amputation, including enough healthy skin to insure the removal of all diseased tissue. The skin was united by sutures. The patient died of other troubles a year later. There had been no return of the cancer at the time.

*Microscopic Examination.*—A large portion of the mass was covered by skin which had undergone extensive changes, the epithelial cells having multiplied and extended in bands or columns deep into the surrounding tissue. All characteristic structures of the skin had been destroyed. The tissue in the depth was made up of columar and concentric masses of cells irregularly arranged and separated by connective tissue which was infiltrated by small round cells. The columns were continuous with the cellular strands extending from the epidermis. At some parts of the tumor no epidermis was visible, the conglomerate mass of columns and spheroid bodies coming to the surface, where it was covered only by a narrow zone of fibrin and small raised cells. In parts, small areas of normal skin were intact. The character of the cells of the growth differed at different portions of the tumor, being principally polyhedral near the ulcerated surface and flatter towards the center. The flat cells formed a number of pronounced epithelial pearls characterized by their bright red color when stained with hematoxylin and eosin. This case and two others reported involving the helix tend to corroborate the statement that the helix is the most frequent seat of cancerous growths about the ear.

## AUDITORY CANAL.

**Anomalies.** A. H. Cheatle[1] reports a case of *occlusion of the auditory meatus by a membrane* stretching across the deep meatus. After the membrane was removed the entire membrana tensa was found to be absent, while the handle of the malleus, incus, stapes, and stapedius muscles were plainly visible.

**Exostosis.** M. Yersley[2] reports two cases of pedunculated exostoses of the auditory canal. Each growth was removed, one with a cold wire snare, the other with a pair of dental forceps.

H. Tilley[3] reports a large *hyperostosis* of the auditory meatus, after the removal of which extensive destruction of the tympanum and mastoid was found.

Operations in the nose should be avoided as much as possible, according to Dundas Grant,[4] when the auditory canals are occluded by hyperostoses. There is always more or less danger of tympanic inflammation, following such operations, and when occlusion of the auditory canal makes a paracentesis impossible, the danger from such inflammation is much greater.

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(1) Jour. Laryngology, Rhinology and Otology, March, 1902.
(2) Jour. Laryngology, Rhinology and Otology, May, 1902.
(3) Jour. Laryngology, Rhinology and Otology, May, 1902.
(4) Jour. Laryngology, Rhinology and Otology, May, 1902.

**Miscellaneous.** A case of *acquired deaf-mutism,* due to closure of the auditory canal by a mass of cerumen, is reported by M. Collier.[1] A child, 9 years old, had gradually become deaf since about 3 years of age. As the deafness increased, her vocabulary gradually became limited to a few sounds. No treatment was instituted other than the removal of a mass of inspissated cerumen, after which her hearing returned immediately, and she rapidly regained her knowledge of words.

H. Coussieu[2] has made a bacteriologic examination of 12 auditory canals. He found in two cases streptococci; in three staphylococci; in two pneumococci; in five mixed microorganisms. He emphasizes the importance of thorough disinfection of the auditory canal before perforating the membrane. He uses a bath of equal parts of alcohol and ether for 10 minutes, then a warm antiseptic wash followed by sterilized water.

W. H. Roberts[3] reports a case in which he operated for a supposed sequestrum of the auditory canal, but found a *piece of cork* which the child had put into the ear several months before. At the time of the operation, the canal was swollen and filled with pus and granulations. The drum membrane was intact and the hearing became normal.

## MIDDLE EAR.

**Anomalies.** At a post-mortem examination of the temporal bone, Lafarelle[4] found a *diverticulum* extending downward, inward, and slightly backward from the tympanic cavity. The cavity formed by this malformation was about the size of the middle ear proper, and was connected with the middle ear by a narrow isthmus.

A case of *pneumatocele* of the side of the head communicating with the nasopharynx through the Eustachian tube, the middle ear and an opening in the outer table of the mastoid, is described by G. Morgenthau.[5] Pressure upon the enlargement caused it to disappear, while forcing

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(1) Medical Press and Circ., Jan. 15, 1902.
(2) Annales des Maladies de l'Oreille du Larynx, etc., May, 1902.
(3) Annals of Otology, Rhinology and Laryngology, August, 1902.
(4) Revue hebdomad. de Laryngology, Nov. 30, 1901.
(5) Chicago Med. Recorder, July 15, 1902.

air through the Eustachian tube caused it to become tense again.

**Foreign Body.** H. Jones[1] reports a case in which pieces of coal were removed from the middle ear. The patient, a collier, claimed compensation for injury to the left ear, alleging that a piece of coal flew from the point of his pickaxe into the ear.

On examination, a perforation was seen in the anterior part of the membrane low down, and behind this something black could be seen through the semi-translucent membrane. No coal was found in the meatus itself, though some small particles may have been lying against the lower edge of the tympanic ring. A probe bent at the tip was then passed through the perforation, and a loose foreign body could be felt behind the membrane.

By a little manipulation of the probe, the largest fragment was brought into the perforation, and out into the meatus. Several smaller pieces were afterwards removed by syringing. The perforation had the appearance of an old one, and there was a dry perforation of the right membrane. A week or two later small pieces of coal were removed from the right meatus, though none were found at the first examination, and the patient had not worked in the interval, and this fact and the patient's manner, especially his exaggeration of his deafness, led the surgeons to think that the coal had been deliberately put into the ears by the patient, though it was probable that it had got into the left tympanum through the meatus by the action of gravity.

**Perforation.** A perforation of the membrana tympani caused by a stroke of lightning, is reported by H. MacNaughton Jones.[2] The patient was rendered unconscious and some hours afterward when examined, two small perforations were found in the drum membrane near the posterior superior quadrant and another below the umbo. Considerable impairment of hearing was noticed, and a loud tinnitus was present. The author has seen no other case recorded in otologic literature where a perforation in the drum membrane has been found as the result of lightning.

**Acute Otitis Media.** In considering the etiology of *ear*

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(1) Jour. of Laryngology, Rhinology and Otology, May, 1902.
(2) Jour. Laryngology, Rhinology and Otology, May, 1902.

*complications following measles*, H. Jarecky[1] thinks there is no doubt that the mucous membrane of the auditory apparatus partakes of the general catarrhal condition and eruption of the exanthem; also that the general poisoning of the disease affects the organs of perception. The suppurative condition is due to a mixed infection, which is easily propagated in a system weakened by disease.

The microorganisms found are the streptococcus pyogenes, staphylococcus pyogenes, albus, aureus and vitreous, Fraenkel's pneumococcus or diplococcus, and Friedlander's pneumobacillus.

The streptococci and the pneumococci are found to do the most mischief. Bacteriologic diagnosis will undoubtedly be the guide in the near future, as to prognoses and to operative procedures.

Other cases are due to extension from the post-nasal space through the Eustachian tubes, and principally found where the vault of the pharynx is occupied by hypertrophied lymphoid tissue. This can be easily understood, when we consider that the increased secretion, on account of the patient's horizontal position, cannot escape easily and so helps to block up the opening of the tubes.

E. H. Williams[2] has made a study of *otorrhea following diphtheria and scarlet fever*. He concludes: **1.** That bacteriologic cultures should be made in all cases of otorrhea and rhinorrhea, especially in hospital practice. 2. That the bacilli at all resembling diphtheria bacilli when found must be regarded as a modified variety of that organism, bearing in mind that their staining properties are often the only available means of diagnosis. 3. That systematic isolation of these rhinorrheas and otorrheas is not only justified but advisable. 4. That such isolation may be reasonably expected to reduce post-scarlatinal diphtheria. 5. That it is an open question whether such mild cases require antitoxin treatment. Some cases, however, seem to indicate the use of the serum. It may do good, and can do no harm. It is important also that these cases should be separated from healthy persons. 6. That these discharges unassociated with sore throat, and there-

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(1) American Medicine, July 19, 1902.
(2) British Med. Jour. Dec. 21, 1901.

fore easily overlooked, may be the cause of unaccountable outbreaks and the persistence of disease, among school-children.

When incising the drum membrane H. Coussieu[1] uses no local anesthetic. The patient is placed in a recumbent position, thus being better able to remain quiet during the incision. He believes that otitis media following an infectious malady is usually mono-microbic and when only one variety of germs is found the suppuration is usually of short duration. If several forms of microbes are found in the beginning of a disease, it will probably follow a chronic course.

E. B. Dench[2] finds a class of cases of acute otitis media in which the inflammation seems to be located principally in the vault of the tympanum. When the tympanic vault is the seat of inflammation, mastoid suppuration is apt to result. These cases are characterized by the presence of very little discharge when incised. As the knife passes through the membrane, gas escapes which has been confined in the tympanic cavity.

F. R. Packard[3] reports a case of *extensive necrosis of the temporal bone* resulting from otitis media following diphtheria. A suppuration existed in the opposite ear at the same time from the same cause, but no indication of necrosis could be detected. Repeated bacteriologic examinations of the discharge from each ear resulted in the finding of streptococci and staphylococci. It is interesting to note the wide difference in the amount of destruction in the two ears while the bacteriologic findings in the two cases were identical.

The following facts are offered by J. K. Love[4] as evidence that a diseased nasopharynx may harbor microorganisms which may extend to the middle ear by the Eustachian tube and cause suppuration:

1. After the exanthemata, cases of obstinate suppurative ear disease are more common in children who have enlarged tonsils and post-nasal adenoids than in those who have not.
2. Without any other operative treatment cases which

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(1) Annales des Mal de l'Oreille du Laryn., etc., May, 1902.
(2) Archives of Otology, April, 1902.
(3) Annals of Otology, Rhinology and Laryngology, August, 1902.
(4) Glasgow Med. Jour., July, 1902.

have hitherto resisted treatment, will sometimes recover if the nasopharynx be cleared of adenoid masses.

3. Recurring suppurative disease of the middle ear will sometimes finally disappear if the nasopharynx be cleared of adenoid masses.

Acute non-suppurative otitis media is believed by H. O. Reik[1] to be a frequently *neglected factor in facial paralysis.* He summarizes as follows:

1. If exposure to cold in one way or another is the cause of most cases of facial paralysis, it probably acts most commonly through the production of an otitis media, whereby the nerve becomes involved, either in a direct extension of the inflammatory process to its exposed sheath, or through pressure upon it of an exudate.
2. This being admitted, the form of treatment which offers the most rapid and satisfactory result is a paracentesis of the tympanic membrane, to free the cavity of its abnormal contents.
3. We should never in any case of facial paralysis neglect to examine the ear.

A great number of cases of slight unilateral facial paresis have been examined by Lannois and Paulet,[2] and they express the opinion that all are due to a lesion of the facial nerve from an otitis media.

**Treatment.** E. L. Meyerhof[3] thinks that it is not always possible to prevent the more serious complications of suppurative otitis media even by early and careful treatment of the acute stage. Four cases are cited which went on to suppuration of the mastoid requiring operation regardless of treatment. Of the treatment he says that in nearly every case, early treatment, of which the most important is free incision of the drum membrane (all other treatment is secondary), relieves pain, both spontaneous and induced, and in children should be followed by a fall of temperature, even if the exudate is only serous. We should, if possible, anticipate rupture by incision, and thus prevent perforations of the drum in positions where drainage will be interfered with; and furthermore, the artificial opening heals better and with

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(1) Johns Hopkins' Hospital Bulletin, April, 1902.
(2) Revue de Medicine, February, 1902.
(3) Archives of Otology, February, 1902.

less scarring, while chronic suppuration is undoubtedly prevented by the timely incision. However, in spite of our efforts there will be a few cases that, owing to anatomic peculiarities and other conditions, will not get well but grow worse, and nothing short of a thorough exposure of the mastoid will suffice to restore the patient to health. What percentage of cases will not be controlled by early treatment is not possible to state, but it is believed to be small.

**Hemorrhage.** Raoult and Specker[1] report a case of *hemorrhage from the ear during typhoid fever.* On the eleventh day of the fever, the child, 6 years old, suffered from intestinal hemorrhages. On the thirteenth day, there was bleeding from the nose and the right ear, and the latter continued about four days, when suppuration began. The suppurative otitis pursued an uneventful course to recovery.

Two fatal cases of *hemorrhage from the internal carotid artery* through the middle ear are reported by Jürgens.[2] Each case had a discharge from the ear for two or three weeks previous to the hemorrhage. It was suspected that the patients had used some cauterant in the ear, in order to escape military service. The sloughing of the walls of the artery was extensive and the hemorrhages were very profuse. The patients did not die from hemorrhage but from lepto-meningitis or pyemia, due to septic complications.

Jürgens also reports a case of *hemorrhage from the jugular bulb* after the application of a strong caustic to the ear. The object of the patient in putting the caustic into the ear as in the former cases was to escape military service. The drum-head and ossicles were destroyed, the tympanum was bared of mucous membrane, and the bone appeared white. The blood flowed freely and steadily from the ear, but was easily controlled by plugging. A probe was passed through the opening in the tympanum into the jugular vein. Pneumonia followed, but the patient recovered, and was dismissed from the hospital five weeks after the first hemorrhage.

Heerman[3] reports a case of *hemorrhage from the carotid*

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(1) Revue hebdom. de Laryngol., etc., Feb. 1, 1902.
(2) Monatschrift für Ohrenheilkunde, January, 1902.
(3) Archiv für Ohrenheilk., Vol. 55, page 86.

*artery* occurring during the course of a subacute, left-sided middle-ear suppuration *after scarlet fever* in a child 3½ years old. After syringing the auditory canal very severe arterial hemorrhage occurred. The common carotid was ligated and the radical operation undertaken. A sequestrum with sharp edges was found on the floor of the tympanum which had probably broken from the wall of the carotid. After removal of the sequestrum the area was curetted until profuse hemorrhage took place. The hemorrhage was controlled by tamponing. After 14 days there was sudden unconsciousness, vomiting and paralysis of the right extremities. Granulations in the floor of the tympanum were removed. Some fever for a few days, vomiting, and stupor, followed by death 32 days later. At the autopsy a purulent thrombosis of the internal carotid was found extending to the circle of Willis. There were purulent deposits on the pia, pons, and cerebellum. The left ventricle was filled with greenish, discolored fetid pus. An encapsulated abscess, as large as a walnut, was found in the corpus striatum.

**Chronic Nonsuppurative Otitis Media.** D. S. Reynolds[1] makes a plea for the *early treatment of slight defects of hearing.* Through lack of appreciation of the importance of early treatment, and because of the belief that the deafness is hereditary nothing is done until the hearing has become permanently impaired.

The fact that different members of the same family have impaired hearing has led many to assume that deafness is an inherited condition. It is true that many persons, the subjects of inherited defects of structure, as well as blood-taints, may suffer impaired hearing, as in the case of syphilitics. But syphilis no more tends to the production of deafness than to blindness, and no more to blindness than to periosteal nodes and cutaneous maculæ.

That form of deafness due to abnormal conditions of the Schneiderian and pharyngeal membranes, and which comes on insidiously, is the type most commonly set down by the laity as hereditary.

It is important to make the diagnosis between structural defects of hereditary character, defects due to pathologic

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(1) Lancet-Clinic, June 7, 1902.

conditions of the perceptive apparatus, and obstructions or defects in the conducting media.

Slight deafness from occlusion of the external auditory canal, the presence of foreign bodies in contact with the membrana tympani, interruptions from any cause of the passage of air through the Eustachian tube to the tympanic cavity, impaired function of the ossiculæ are all remediable in proportion to our ability to locate the cause and remove it.

A little timely attention to the condition of the upper respiratory membrane, and to the proper inflation of the tympani, might easily bring relief, or in any case prevent further extension and an increase of the deafness.

C. J. Blake[1] has made careful and extended observations of the *anomalies of tension of the transmitting apparatus.* He thinks the opportunities for the clinical observation of anomalies and their effect upon the transmission of musical tones have been largely increased since the introduction into general use of the various forms of pneumatic massage apparatus. These instruments, while exceedingly valuable in some cases, are prone to over-use, because of the readiness and simplicity of their application and the temporary relief afforded the patient by the consequent mobilization of the sound-transmitting apparatus as a whole. It should be borne in mind, however, that precisely as the ultimate expenditure of energy in phono-massage bears upon the ultimate vibratory and the perceptive apparatus, the proximate expenditure of energy in pneumo-massage comes upon that portion of the membrana tympani most subject, from its intrinsic structure and larger area, to the deleterious effect of excessive excursion mechanically induced.

Another tension anomaly, less frequently observed, is that which occurs when a thickening of the membrana tympani itself serves to conserve the tension of its different portions and the expenditure of what may be termed a misplaced energy comes upon the malleo-incudal articulation. Repeated and forcible movements of the membrana tympani outward, especially when that membrane is thickened and interstitially resistant, serve in time to stretch the tendon of the tensor-tympani muscle and thus

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(1) Archives of Otology, April, 1902.

permit an exaggerated movement of the head of the malleus. This movement in its turn stretches not only the capsular ligament of the malleo-incudal articulation, but also the lateral protective ligaments, or check-bands, of the malleus, nor does the difficulty end here, for the repeated shocks from the inferior elevated border of the lower facet of the malleus upon the incus, tend to impair the integrity of the incudo-stapedial articulation under the uncounteracted contraction of the stapedius muscle.

In cases of long standing chronic nonsuppurative otitis media, especially when the function of the labyrinth becomes impaired, Blake advises an exploratory incision through the drum membrane.

The operation affords a means for exact diagnosis not otherwise attainable, at a minimum degree of risk to the remaining hearing, since no injury is done to the important parts of the membrana vibrans, and, after tactile examination of the mobility of the individual members of the ossicular chain, the flap formed of the posterior segment of the membrana tympani can be simply and accurately replaced with the assurance, if aseptic precautions have been duly observed, of a healing by first intention.

J. C. Beck[1] has conducted a series of experiments in the *use of thiosinamin* in the treatment of chronic nonsuppurative otitis media. In the first series of five cases thiosinamin was injected subcutaneously and no other treatment used. The treatment was continued from three months to a year. No improvement could be discovered in any of the cases, while in three cases the tinnitus was greatly increased. In the second series of nine cases injections of thiosinamin were used in connection with other plans of treatment, such as electrolysis of the Eustachian tube, attention to the nose and nasopharynx, and the administration of appropriate constitutional remedies. All of the second series of cases showed marked improvement. From a review of the literature, Beck concludes that: 1. The introduction of the drug in the usual doses is not harmful. 2. That we cannot expect any bactericidal action from the drug. 3. That the drug produces slight tonic effect, due to the slight increase of hemoglobin. 4. That the lymph elements and their changes on admin-

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(1) Laryngoscope, June, 1902.

istration of this drug will be of great therapeutic value.

From his own experience in treating the 14 cases, he makes the following observations: 1. That the injection of thiosinamin without mechanical treatment did not improve the condition, except to partially relieve the tinnitus. 2. That with the aid of electrolysis and injection of thiosinamin the simple bougie could be passed with much greater ease, and inflation was much easier after a short time than had been experienced in cases without thiosinamin or electrolysis. 3. That all the cases treated with thiosinamin and electrolysis improved in from two to eight months in all respects—hearing, tinnitus aurium, general condition, etc. 4. That before using the thiosinamin careful inquiry should be made for possible contraindication for its use, such as coexisting chronic tuberculosis, malignant tumors, scars, which support the abdominal organs in the abdominal walls, such as are found after laparotomy and hernia.

[That thiosinamin has a decided solvent effect upon cicatricial tissue seems well established. The Editor has used the remedy in a number of cases and has seen marked improvement in hearing result from the administration of 3 grains in capsule at night for from one to four months. The most decided improvement has occurred in the post-suppurative cases where cicatrices seemed to interfere with the hearing.]

U. Melzi[1] makes use of the rubber sounds in chronic catarrhal affections of the middle ear and the Eustachian tube. He finds that 66 per cent of such cases suffering from middle-ear catarrh have nasal obstructions as well, while 46 per cent of those suffering from nasal catarrh have middle-ear disease. He recommends progressive dilatation of the Eustachian tube by sounds and catheter. He claims better results than could possibly be obtained by simple catheterization. The first sound introduced should be dipped into a 10 per cent solution of cocain before insertion, and after withdrawal dipped again into a solution of iodin and reapplied. Three cases are reported as showing satisfactory results after the lapse of several months.

To prevent the pain caused by the use of the *Lucae spring*

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(1) Archives Internationales de Laryngologie, etc., March-April, 1902.

*pressure probe*, which he highly recommends, C. J. Koenig[1] has devised the plan of dipping the end of the probe in soft paraffin. Before the paraffin hardens it is applied to the membrane. The soft paraffin conforms itself to the surface of the membrane. By this means greater pressure can be employed, and the treatment continued longer than when the bare rubber is applied.

E. Pynchon[2] favors slow vibrations in diseases of the middle ear, and rapid vibrations in diseases of the labyrinth and auditory nerve. He has modified the Victor electric pneumatic massage apparatus so that the number of vibrations can be reduced to 40 per minute.

In the treatment of chronic nonsuppurative otitis media, Chalmers Watson[3] has made use of daily instillations of a *preparation of bone marrow*. Very satisfactory reports are given both as to the improvement in individual cases and in the percentage of cases improved by the treatment.

In cases of relaxation of the membrana tympani, C. J. Blake[4] uses an *application of collodion*. The collodion not only gives protection to the stretched portion of the membrane, but also by its mechanical contraction, favors the return of the parts to their normal condition.

Hamm[5] reports good results in the treatment of sclerosis by means of the *pneumatic cabinet*. Each séance lasted about an hour and a half. The pressure was gradually increased up to 1.5 atmospheres, then gradually reduced. Twenty-five to forty treatments were given. Improvement in hearing was not only noted during the treatment, but was progressive after treatment had been discontinued. Hamm expects to maintain the improvement by occasional treatments.

A series of cases operated upon for chronic nonsuppurative otitis media is reported by W. H. Bates.[6] The posterior superior wall of the auditory canal is removed down to the attic and antrum. The primary incision is similar to the incision for the mastoid operation, except that it is shorter. The ossicles and membrane are removed and

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(1) Archives International Laryngologie, etc., September-October, 1901.

(2) Laryngoscope, May, 1902.

(3) British Med. Jour., March 22, 1902.

(4) Archives of Otology, April, 1902.

(5) Muenchener med. Wochenschrift, Feb. 4, 1902.

(6) Archives of Otology, April, 1902.

the antrum, attic and auditory canal made into one smooth cavity. The skin incision is closed with sutures. Antiseptic precautions are necessary. The object of the operation and after-treatment is to remove the connective tissue from the inner wall of the middle ear and to prevent its reforming. All of the 20 cases operated upon have been decidedly improved. Those cases have been improved most which could hear all of Hartman's set of tuning-forks better by bone than by air conduction. The principal objections to the operation seem to be the long time which the healing requires and the difficulty in getting patients to submit to the operation.

S. Gradenigo[1] makes a report on the results of *clearing out the tympanic cavity* as a means of improving the hearing. He has operated upon (1) sclerosis; (2) chronic catarrhs; (3) post-suppurative cases showing no destructive changes; (4) post-suppurative cases showing destructive changes. He secured the best results in group 4, while in sclerosis the prognosis was not so good. However, in two cases of sclerosis the hearing was distinctly benefited both as regards hearing power and tinnitus. One of these cases had been affected 30 years. In groups 2 and 3, much depends upon the integrity of the structure of the middle ear. Nine cases in all were operated upon.

The author concludes that: 1. The more complete the integrity of the internal ear the better the hope of success. 2. The best results are obtained in post-suppurative cases with partial destruction of membrane and ossicles. Good results are also obtained in the little-known class of post-suppurative cases which show no trace of destructive change, but in which there is a clear history of suppuration. 3. In the dry form of middle-ear disease, results are not so good. 4. Curiously enough, they are more favorable with sclerosis than with chronic catarrhs, in spite of the fact that the internal ear is more frequently affected with the former condition. This may be explained by the fact that in sclerosis, the membrana tympani is atrophied, and less apt to be replaced by a cicatrix; so that the labyrinth remains more accessible to sound waves. In catarrhal cases a cicatricial membrane generally soon forms. 5. The treatment of the wound after operation is most important, especially the avoidance of sepsis. 6. Marked labyrinthine symptoms contraindicate operation.

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(1) Archiv. für Ohrenheilkunde, Vol. 54-55.

**Chronic Suppurative Otitis Media.** J. K. Love[1] gives the following picture of a class of cases of *chronic suppurative otitis media due to teething* as seen in the Glasgow Royal Infirmary Ear Dispensary. He uses the word "teething" as it is used by the parents, and it is often impossible to get behind the term and find anything more definite. Such cases begin as acute suppurations and during the disturbed period of dentition become chronic. They commence, as a rule, with the eruption of the incisor teeth before or about the age of 6 months, and generally without any other accompanying disease. At that age adenoid growths or throat affections of any kind are not common. The cases are rare among the children of the well-to-do, but occur typically among the under-fed and badly-housed children of the poor. Often when brought to the practitioner the disease has already wrought great destruction. The middle ear can, with difficulty, be seen through the speculum, for the canal is narrow and its wall swollen, but the probe impinges on bare and often necrosed bone. There is copious discharge, which may excoriate the lobule and side of the neck and give rise to a well-marked eczema. The mastoid neighborhood may be swollen, and pus may sometimes be made to flow from the external auditory canal by pressure over the mastoid and the tissues in the side of the neck below the auricle. The surrounding lymphatic glands may be swollen and may fluctuate. Often the deeper structures are damaged and the facial nerve involved and at a later stage pus bursts over the mastoid process, sequestra come away, or the whole mastoid process may be easily scooped out by a Volkman's spoon.

In spite of the great destruction in the middle ear and mastoid region, brain complications in these cases are not very common. On the other hand, the death-rate from this type is very large. The children seldom thrive, and often fall victims to some of the commoner forms of tuberculosis, or some intercurrent acute disease cuts short the life of the little sufferer. In young children affected with the dentition type of the disease, whether the destruc-

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(1). Glasgow Med. Jour., July, 1902.

tive process be extensive or not, the disease is usually tubercular and the prognosis bad. But even here the radical operation greatly increases the patient's chances of recovery, and, unless tubercular disease be suspected elsewhere, a favorable opinion may be given as to the results of operative treatment.

F. R. Packard[1] reports a case of *somnolence and loss of memory* in a man 29 years of age, resulting from suppuration of the middle ear complicated by cholesteatoma. For upward of 12 years the patient had had at intervals a discharge of foul-smelling pus from the left ear. This symptom, however, seems to have given him but little concern, as he had never considered it necessary to undergo any course of treatment for its relief. During the last year the patient had noticed that his memory was failing and that he was subject to attacks of intense sleepiness alternating with occasional headaches. This forgetfulness was such that he could not remember the simplest things; he would forget the names of people, and the things which he had intended to do in his work, and was absolutely unable by any effort to concentrate his memory so as to remedy the defect. Examination, after washing out a quantity of inspissated pus from the external auditory canal, revealed almost total loss of the drum membrane with a mass of granulation tissue covering over the upper part of the exposed middle-ear cavity. It was impossible to detect dead bone with the probe. There was marked bulging of the upper posterior wall of the external auditory canal. Operation was advised, and after opening the mastoid, a great quantity of dead bone in immediate proximity to the middle-ear cavity with large cholesteatomatous masses in the interior of the mastoid process was removed. The patient made an uninterrupted recovery, and when last seen, five months after the operation, he stated that he had had absolutely no return of headache or of somnolence, and that his relatives noticed that he was able to remember things, and was much brighter mentally. There was no discharge from the ear.

A case of *somnolence caused by disease of the middle ear* is reported by W. G. B. Harland.[2] A boy of 13, for

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(1) Medical News, March 8, 1902.
(2) Phil. Med. Jour., March 29, 1902.

a month had shown a disposition to sleep most of the time. He could be kept awake only by continuous action, and one day he slept the entire 24 hours. A small mass of cerumen was removed from the ear. Behind this a large perforation of the membrane and some pus was found. After thorough cleansing, the somnolent symptoms disappeared. Three months later the somnolence returned, but disappeared immediately after cleansing the ear. Harland suggests two conditions to account for the symptoms: one, pressure upon the labyrinthine fluid, the other, meningeal irritation.

C. H. Burnett, referring to Harland's case, states that somnolence from otitic influences is rare and its etiology obscure. There are few cases on record, and this is the only one that has come under his personal observation. Somnolent and syncopoid states dependent upon aural lesions may be divided into two classes, viz.: (1) Those depending upon otitic causes, and (2) those depending upon direct pressure upon and undue impaction of the stapes in the oval window of the labyrinth.

1. The extension of the suppurative otitic process may be diffused over any part of the cerebral surface, or we may find circumscribed collections of pus in the subdural space and in the interstices of the arachnoid. Autopsy may show that such circumscribed collections may be the later starting point of a diffuse meningitis.

2. Respecting the second classification of cases, the syncopoid or semi-somnolent states—those dependent upon direct and undue inward pressure of the stapes—it may be said that they are more frequent and more easily explained. These may occur either in those with intact or perforated membrana tympani. In the first form, any force that carries the drum-head and ossicles unduly inward induces excessive impaction of the stapes in the oval window and mediately irritative pressure upon the labyrinth fluid.

Compression of this fluid in the bony labyrinth, if not excessive, is compensated by recession of the membrane of the round window. If the compression of the labyrinth is more than can be counterbalanced by recession of the round window membrane, the terminal filaments of the ampullar branches of the auditory nerve in the semicircular canals are unduly compressed, and there are observed resultants, vertigo, syncope and mental hebetude.

**Tumor.** A tumor of the middle ear springing from the inner and posterior tympanic walls, simulating exostosis, but consisting of calcareous laminæ is reported by W. C. Braislin.[1] The patient, a woman of 35, had suffered from chronic suppurative otitis media for 23 years. Recently, however, her attention had been drawn to the left ear, by reason of an occasional beating tinnitus, and by a change in the character of the discharge, which had become much more abundant than formerly, and of a thin, watery consistency.

The left membrana tympani on first inspection was hidden by a rather thin, watery muco-pus. The entire membrane was absent, but the cavity of the middle ear was almost entirely occupied by a smooth, glistening, pinkish white, clearly outlined excrescence, which, on careful inspection, was observed to spring from a base entirely within the annulus tympanicus. A light probe glided readily over the growth; there was no grating under the probe, and the growth appeared to be everywhere covered with living membrane, the probe coming to rest along its entire periphery within the tympanic ring and at its posterior and inferior aspects very close to the latter.

The mass presented the appearance of a smooth, bony growth springing from the middle-ear structures and covered with normal membrane. As the growth appeared to be increasing in size, an operation was undertaken for its removal. Instead of being hard, as was expected, a small gouge pierced the mass under the first moderate taps of a light hammer. The finger holding the cutting instrument easily detected the entrance of the instrument as the thin shell gave way. The growth was removed in fragments, leaving the tympanum with its normal cavity reestablished. The fragments reconstructed showed a thin, convex shell, of bone-like consistency, with a transverse diameter of about one-quarter of an inch. Microscopic examination showed a laminated structure which had been the seat of a calcareous deposit. Braislin suggests that this peculiar condition is most easily accounted for by sup-

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(1) Archives of Otology, Dec., 1901.

posing the condition to have been a fibroma which had undergone calcareous degeneration.

B. F. Church[1] emphasizes the *surgeon's duty to his patients suffering from suppurative otitis media.* That chronic otitis media, especially when accompanied by purulent discharge, constantly imperils life, is well known by all aural surgeons. This risk to life from the passage of infective material to the cranial cavity, in all cases of suppurative processes of the middle ear, so well understood by the surgeon, is, as a rule, looked upon lightly by the patient. It is not unusual to find those who consider their otorrhea one of Nature's mysterious yet beneficent methods of ridding the system of some materies morbi which it is otherwise unable to cope with. The patient has the right to know as well as he may the true condition of affairs and the dangers that lurk in his apparently harmless discharging ear. By acquainting the patient with his condition, and impressing him with the danger, the surgeon's responsibility ceases should he refuse to concur in the radical procedure advised. No set of rules can be laid down to guide in every case as to when to operate and when not to operate. Apparently dormant pathologic processes in the middle ear may suddenly become acute. The ominous symptoms of severe pain in the head, rigors, fever, delirium, convulsions and coma indicate too plainly the course the disease has taken and the catastrophe which is almost sure to follow. Persons suffering from chronic suppuration of the middle ear may be a source of danger to others. Hovell reports a case of a medical practitioner who had this affection and transmitted puerperal fever to several women whom he attended during their confinement and was compelled to give up his obstetrical practice on account of it. It is probable the mastoid cells are more frequently affected in middle-ear suppuration than is generally supposed. Any impediment to the free escape of secretions from the middle ear favors mastoid involvement. Such impediments in the form of contracted meatus, polypi, granulations and membranous bands across the tympanum are by no means infrequent.

Recent investigations have shown that the spread of the

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(1) Annals Otology, Rhinology and Laryngology, August, 1902.

suppurative process is mainly due to the action of micro-organisms (streptococci and diplococci). Microscopic examination should therefore be made of the secretions in all acute and chronic cases of tympanic suppuration. The presence or absence of pathogenic organisms in the discharge will greatly aid in prognosis of a given case.

Church reviews the anatomic conditions which facilitate the extension of pathogenic processes from the tympanum.

In a large per cent of cases septic infection spreads by direct contact. A portion of the osseous wall of the tympanum being carious, perforation takes place, leading to or beyond the dura mater. These carious points are usually located in the roof of the tympanum, roof of mastoid antrum, and groove of the sigmoid sinus. An entirely different class of cases are those in which extension takes place in absence of caries or when the bony lesion does not extend through to the dura mater. These may be called anatomic, as infection takes place through anatomic or natural openings. The avenues of infection are four or more in number. (1) Gaps or dehiscences in the bone; (2) along prolongations of the dura mater; (3) through the labyrinth, after destruction of the tissue, covering the fenestræ; (4) through minute veins, in which thrombosis takes place, and extends from these to the nearest sinus. Physiologic or natural openings from the tympanic cavity through which infective material could pass to vital parts may be found in the roof, floor, anterior wall, the posterior and inner wall of the cavity.

Church reports two cases of death from acute exacerbation of chronic suppurative otitis media. In each a radical operation was performed, but too late to save the patient's life. Church feels sure that these as well as other cases could have been saved by timely operation.

De Champeaux[1] reports a case of *Jacksonian epilepsy* due to a disease of the middle ear. After the removal of the polypus from the ear, and curetting the walls of the middle ear, the discharge from the ear ceased, and the epileptic seizures disappeared as the ear improved.

R. Arthur[2] reports a case of *acute exacerbation of chronic suppuration* of the middle ear, following an operation for the removal of adenoids.

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(1) Arch. Internat. de Laryngologie, etc., November-December, 1901.
(2) Indian Medical Jour., Feb. 12, 1900.

Gaudier L'Echo[1] has experimented with *methylene blue* in chronic suppurative otitis media. He finds it superior as a deodorant in the fetid cases, but thinks it has no more influence in stopping the discharge than many other remedies used for the same purpose. It has the disadvantage, however, of staining everything it touches an intense blue. U. Melzi[2] treats purulent otitis media by first cleansing the ear and then dusting the cavity with powdered acetanilid. Pick[3] reports a case in which nature had performed a radical operation for chronic suppurative otitis media. The sequestrum including all the posterior bony wall of the meatus had come away, partially exposing the antrum. The otitis followed an attack of pneumonia 18 months previously.

**Diabetic Otitis.** In otitis of diabetic origin, L. Bar[4] finds certain characteristics: 1. The right ear is more frequently affected. 2. The pain is intense and is not relieved by paracentesis. 3. The discharge is persistent and is frequently hemorrhagic. 4. The mastoid almost always becomes involved. 5. Edema where it occurs is a grave sign, and indicates a diffuse osteitis of the subjacent bone. Intervention should be prompt, before edema develops, but should not be undertaken when the urine indicates an excessive proportion of sugar and acidity. These must be reduced before operating, as when the organic fluids are so much altered they favor bacterial proliferation. Affections of the heart, kidney or lungs and cachexia forbid intervention, and general narcosis is peculiarly dangerous in case of diabetes. But bearing all these points in mind, and after preparing the patient with a suitable diet and administration of sodium bicarbonate to alkalinize the blood, intervention should be as prompt as possible. In one of his patients the sugar in the urine fell from 60 to 20 gm. immediately after trephining a mastoid abscess, and this diminution persisted. The patient was a woman of 73 who had eliminated an average of 60 gm. of sugar a day for thirty years.

H. Eulenstein[5] reports a case of acute toxemia and death

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(1) Med. du Nord, Oct. 13, 1901.
(2) Revue de Therapeutique, January, 1902.
(3) Monatschrift für Ohrenheilkunde, April, 1902.
(4) Revue hebdom. de Laryngol., No. 37, 1902.
(5) Archives of Otology, April, 1902.

resulting from *suppuration in the temporal bone.* The autopsy showed some swelling of the spleen and moderate edema of the lungs, but nothing in the head beyond a little serous infiltration of the brain, and a small area of nodular infiltration in the wall of the lateral sinus. Pyemia resulting from sinus or jugular involvement is common, but cases in which there are no symptoms of pyemia, but a sudden, rapidly developing general infection are comparatively rare. Eulenstein has collected and analyzed the reports of eight cases similar to the one under consideration and finds that there were two with chronic aural suppuration and six with acute, and the ages varied from 7 to 43. In two cases there was extensive infiltration in the region of the ear, which Körner looks upon as an evidence of a serious septic process. The time of illness varied from one day to three weeks. The fever was irregular, and not characteristic, and chills occurred in only one case. Metastases did not occur; albuminuria occurred twice and jaundice three times.

When the symptoms began, they, as a rule, became rapidly severe, and gave the impression that the toxins were cumulative in their action. Death usually occurred in deep coma.

In six cases radical operation was attempted, but in no case was permanent benefit attained, since every patient died. The autopsies naturally afforded some points of interest. In nearly all the cases the organs of the chest and abdomen showed unimportant lesions. In two cases there were evidences of some thrombophlebitis, while in the other six there were no signs, and in the few cases in which the jugular vein was examined in its entirety there were no gross signs of disease. In three cases, the bacteriologic examination showed streptococci, and in the five others nothing.

These observations show that suppurative disease in the temporal bone may cause general infection in two ways. The inflamed wall of the sinus may permit the passage of bacteria or their toxins into the blood, so that death may occur from toxemia without any special increase in the inflammatory process, or the bacteria may be taken directly into the circulation by the large, and especially the small vessels, and thus be permitted to increase with great rapidity in all parts of the body. We do not know why the same kind of microorganism behaves with different degrees of virulence under different circumstances, though individual susceptibility must play some part.

**Influenza Otitis.** M. A. Goldstein[1] calls attention to the severity of the ear complications accompanying influenza. In the symptomatology of influenza otitis one of the most treacherous conditions to cope with is the marked deafness, often beginning in the early stages and persisting until all other symptoms have subsided. Hearing tests with the watch and tuning-fork indicate that the form of deafness common to influenza otitis is not that of an impaired conducting apparatus alone, but seems frequently to involve the labyrinth as well. In many cases in which careful tests have been made, a marked diminution of bone conduction has been found, thus proving the involvement of the labyrinth in this affection. It seems very plausible that in the extreme congestion of the entire mucosa of the ear the labyrinth should also be attacked. This important factor of marked deafness adds to the gravity of the affection and should direct us to a guarded prognosis as to the final restoration of hearing.

Another unusual condition which may unexpectedly occur in influenza otitis is sudden and total deafness. Sometimes in the early stages of the affection, sometimes in the third or fourth week of suppuration, the patient will suddenly discover that he is unable to hear with the affected ear. In three such cases, hearing tests were made soon after the occurrence of this symptom and nerve deafness diagnosed, as indicated by absence of air conduction and decided diminution of bone conduction for watch and tuning-fork.

The main points in the conduct of influenza otitis are given as follows: 1. Epidemic or endemic influenza is the etiologic factor in this affection. 2. A careful differentiation should be made between simple otitis media and influenza otitis. 3. Free incision of the drum membrane at the earliest indication of effusion into the tympanic cavity should be made. This free drainage should constitute the most important principle in the treatment of this affection. 4. A guarded prognosis should be given,

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(1) Laryngoscope, March, 1902.

especially as concerns the complete restoration of hearing. 5. Conservatism is urged concerning operative interference when mastoid symptoms appear, as many of these symptoms are accompaniments of influenza and should be regarded as neuralgias rather than evidences of suppuration.

**Tuberculous Otitis Media.** G. K. Grimmer[1] reports the results of his investigations of the subject of tuberculous otitis media. The object of his investigation, he states, was to answer the following questions:

1. What light is thrown on the nature of the otitis by such symptoms as: the presence or absence of pain; bare bone felt through the external auditory meatus; destruction of bone about the middle ear; facial paralysis; perforation of the inner wall of the mastoid process (Bezold's perforation); enlarged glands over the mastoid process and in the neck; abscesses and sinuses in the same situations, and polypi in the external meatus?

2. What proportion of cases of suppurative otitis media, with bone lesion, are tuberculous (a) in children, (b) in adults; and at what age is the tuberculous form most frequent?

3. Do the naked eye and microscopic appearances of the pus, granulations, and diseased mucous membrane, from the middle ear (where such can be safely removed) afford any reliable evidence; and also, what information is to be derived from a similar investigation of nasopharyngeal adenoids, of an enlarged mastoid gland, or other enlarged glands from near the diseased ear?

4. From what source and by what channel does the bacillus tuberculosis reach the tympanum, and what light is thrown on this point by microscopic examination—post-mortem—of sections of the Eustachian tube, the tympanic membrane (when sufficient has escaped destruction to permit of examination) and other neighboring parts?

5. What relation exists between tuberculous nasopharyngeal adenoids and tuberculosis of the middle ear?

6. Is tuberculosis of the middle ear a primary or a secondary infection, or may it be either?

7. Does the discovery of tuberculosis in other organs

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(1) Archives of Otology, August, 1902.

give any reliable indication as to the nature of the ear disease?

8. How far may inoculation experiments on guinea-pigs, with products of the diseased middle ear, assist in the diagnosis of tuberculosis?

The bacilli find their way into the tympanum in one of three ways: (1) By the Eustachian tube, mechanically, or by extension along its wall; (2) by the blood or lymphatic vessels; (3) through a previous perforation of the tympanic membrane.

Among the chief predisposing causes which are mentioned by various authors are: Phthisis; lupus and tuberculosis of the nose and other organs; hereditary tendency; unhealthy environment; unsuitable feeding; tuberculous relatives; and, in infants, tuberculous nasopharyngeal adenoids.

Tuberculosis of the ear may be a primary or secondary affection, most frequently the latter. There are differences of opinion as to the site at which the disease generally begins in the tympanum.

Tuberculosis of the ear may be acute or chronic. In the acute variety (which, Brieger says, is really tuberculosis plus mixed infection) there is a diffuse, cellular infiltration of the mucous membrane, with proliferation of the cells; giant cells are absent but bacilli are numerous. The result is a rapid caseous disintegration of the mucous membrane. The bone is soon involved, and great destruction of it takes place, frequently with the formation of sequestra; while rapid granulation formation is also a feature of the acute variety. In the chronic form, circumscribed masses of miliary tubercule may be first seen on the superficial portion of the mucous membrane of the tympanum; these caseate, giant cells develop, bacilli are few, and the process gradually spreads deeper by ulceration.

The importance of finding tubercle bacilli in aural discharge is viewed differently by investigators. Many of them take this as an absolute proof of the existence of tuberculous changes in the ear. That it may be difficult or impossible to find the bacillus in an undoubted case is a point agreed on by authors.

The principal characteristic symptoms of tuberculous otitis are: (1) Painless onset of discharge from the ear; (2) two or more perforations; the presence of pale edematous granulations; (3) creamy pus discharge; (4) facial paralysis coming on at a very early stage; (5) bare bone which may be felt through the meatus. It is an important symptom if during an operation the bone be found soft and cheesy and much destroyed by granulations.

The prognosis, on the whole, is unfavorable, owing to the tendency of the disease to involve bone and to spread to other organs, but especially so if the case is already complicated by tuberculosis in other organs, *e. g.*, the lungs. If the disease involves the ear only, recovery may take place under suitable treatment. As to retaining the hearing power in the affected ear, the prognosis is unfavorable.

After giving in detail the report of 19 cases, Grimmer gives the following conclusions:

1. Advanced tuberculous changes may be present in the mucous membrane of the tympanum and of the tympanic membrane itself without producing visible evidence through the external auditory meatus.

2. The membrana propria of the drum-head offers marked resistance to tuberculous infiltration and is only destroyed by a process of erosion. This resistance also accounts for the frequency of multiple perforations in tuberculous cases.

3. Latent tuberculous nasopharyngeal adenoids and all other latent foci must be excluded before deciding that any case of middle-ear tuberculosis was a primary infection.

4. A high percentage, probably 65 to 70 per cent, of cases of suppurative otitis media with neighboring bone lesion, in children under five years, are tuberculous; in older persons, not more than 16 per cent of similar cases are tuberculous.

5. Intraperitoneal inoculation of guinea-pigs is a good and reliable method of proving the presence or absence of tuberculosis in granulations from the middle ear. Reliable tests may also be obtained by examining microscopically such granulations or even an enlarged mastoid gland or nasopharyngeal adenoids when present.

6. In cases of suppurative otitis media, the absence of

ear pain, early and extensive destruction of bone, early facial paralysis, multiple perforations, pale flabby granulations with caseous points in the meatus, about a mastoid sinus, and in the mastoid antrum, and an enlarged mastoid gland point strongly to the disease being tuberculous.

7. The detection of bare bone with a probe through the meatus, the character of the discharge, facial paralysis, and extensive destruction of bone appearing as a late symptom are of doubtful value in arriving at a diagnosis, while the presence of cholesteatomatous masses is positively opposed to tubercles being present.

**Chronic Suppurative Otitis Media in Relation to Life Insurance.** In examination for life insurance P. Hammond[1] calls attention to the fact that it is not always safe to accept the patient's statement regarding the conditions. The mere fact that the patient states that he has had a discharge from the ear should not necessarily militate against him, for all aurists of experience will recall cases where patients have applied for the relief of a discharge which examination has shown to be simply cerumen or, in other cases, due to the moist secretion of an eczema. This shows the necessity for a careful examination with the mirror and speculum in all suspected cases, and positive evidence as to whether the drum is open or not. In the case of any disease of the external ear there is seldom any danger to life, but in the event of a hole in the drum we should be on our guard.

Neither is it wise to take the statement of the patient that he has never had an abscess in the ear, for there are many who are unconscious of the fact that one or both ears are diseased, often as the result of a forgotten trouble in childhood. Even the fact that the patient appears to hear perfectly well does not exclude the possibility of disease.

This is illustrated by the case of a young lady who applied for the relief of a recent deafness in one ear, stating that there was nothing the matter with the other. On examination the supposed good ear proved to be filled with pus, and a little questioning revealed the fact that it had been discharging for over 20 years. The patient had

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(1) Boston Med. and Surg. Jour., May 15, 1902.

become so accustomed to it that she no longer considered it an inconvenience.

In considering the relation of ear disease to life insurance, H. Burger[1] draws the following conclusions:

1. More attention should be paid to ear disease by insurance companies.
2. Insurance should not be effected in acute inflammations of the external and middle ear till the disease has been cured.
3. It is advisable to put off insurance in severe cases of chronic otitis of the external ear.
4. Insurance can be effected in chronic non-suppurative otitis media without delay.
5. Cases of chronic suppurative otitis media should not be accepted if there is (1) inflammation in the attic or mastoid, (2) tuberculosis or cholesteatomata, (3) bone disease, (4) facial paralysis; or if there is associated with the otitis (1) vertigo, (2) headache confined to one side, or (3) narrowing of the meatus, which would prevent free escape of secretion.
6. Other cases of chronic suppuration do not always necessarily require rejection.
7. The possibility of acceptance of such cases with increased premium should be considered after examination by an otologist.
8. Permanent perforation of the tympanic membrane requires a slightly increased premium; other cases completely recovered can be accepted without.
9. Chronic cases of suppuration cured by the radical operation in spite of great bone deficiency, viz., retroauricular opening caused by operation, can be accepted without increased premium.
10. Marked deafness on both sides and severe cases of vertigo should cause increased terms for acceptance.
11. It is highly desirable that the grossly neglected instruction in ear disease in the universities should be increased and improved to correspond with the present position of otology.

[The Editor is in full accord with Burger's eleventh proposition, but believes that in the present state of the science of otology the plan adopted by all reputable American insurance companies, that of rejecting all applicants with discharging ears, is a safe rule.]

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(1) Klinische Vorträge aus dem Gebiete die Otologie und Pharyngo-Rhinologie.

**Cholesteatoma.** W. S. Renner[1] calls attention to two conditions which were formerly grouped together under the name of cholesteatoma. The first of these is a *pseudo-cholesteatoma,* or desquamative disease of the air spaces of the temporal bone, and is due to migration of the epidermis of the tympanum, under certain conditions of pus forming in the middle ear, and from the tympanum into the attic and antrum, where the epidermis collects and forms cholesteatoma-like masses. *True cholesteatoma* of the temporal bone is like that of the occipital and inferior maxillary bones and that of the pia mater. It is a heteroplastic growth, which has its commencement in embryonic life. It has of itself nothing to do with a purulent otitis media, but becomes frequently associated with it on account of its proximity to the tympanum and mastoid antrum.

Otitis media desquamosa or pseudo-cholesteatoma occurs most often after scarlet fever. This condition leads sometimes to the healing of the purulent process; at other times to the formation of cholesteatoma-like tumors in the antrum, which from pressure cause ulceration of the bone. This condition, like the simple chronic process, is accompanied by osteosclerosis, resulting likewise in the obliteration of the mastoid cells. The formation of these tumors generally occurs without general disturbances and without pain. It is only when the mass swells rapidly through an increase in the amount of pus and when it cannot escape through the narrow passage-way, that pain and fever are produced. In most cases the ossicles are only partly destroyed, and the facial nerve is seldom disturbed.

*Diagnosis of Desquamative Mastoiditis.* When the walls of the tympanum can be viewed it is easy to see whether it is covered with this growth of epidermis or not. It is gray and glistening when dry; when moist it is of a dull gray color. It is easily distinguished from the mucous membrane. One can easily tell that there is an over-production of epidermis when dry or moist epithelium is

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(1) Buffalo Med. Jour., June, 1902.

seen behind the edges of a perforation, or when it extends into the auditory canal. The place where it makes its appearance in the auditory canal may indicate the position of the mass in the attic or antrum. It is difficult to recognize this condition through a perforation in Schrapnell's membrane. When the flakes of epidermis cannot be seen they may be brought out by syringing.

In these desquamative cases the pus is small in amount and may dry into crusts which cover over small amounts of pus of very disagreeable odor. To make a diagnosis of the epithelial flakes the external auditory canal should first be thoroughly cleansed, after which the tympanic syringe should be used. When the flakes of epithelium are brought down by thus syringing, they are easily recognized; only the inexperienced can mistake them for inspissated pus. Sometimes very large masses of epithelium are removed in this way, and again no epithelium is found until syringing has been repeated several times. If the space is only carpeted with a layer of epithelium, the diagnostic syringing is useless. Then the diagnosis is made out only during the course of treatment.

True cholesteatoma is a congenital condition which only becomes of clinical importance when it is complicated by, and infected with, the purulent inflammation; and, as the middle-ear is more or less inflamed during the acute exanthemata of childhood, whether clinically manifested or not, it is quite evident that most of these tumors, which reach the air spaces of the temporal bone, are apt to be infected early and thus come under the observation of a physician, while cholesteatomas of the frontal, occipital and lower maxillary bone go unnoticed; therefore, we find them very frequently in children and young people. The majority are found clinically in the second decade. Cholesteatoma is, according to Kuhn, an epithelial, pearl-white tumor, varying in size from a bean to a hen's egg. Its surface is smooth, but may be uneven. It is formed of onion-like lamellæ, of polygonal epidermoid cells, between which are often found cholesterin crystals in varying quantities. The tumor is surrounded with a fibrous membrane, which is connected with the periosteum of the cavity in which the tumor occurs.

The cholesteatomata may be found in the attic and the antrum, and the squamous portion of the bone. The bone is destroyed by pressure only when it is not infected by pus. Infection produces ulcerative destruction which is surrounded by an osteosclerosis. The tumor may expand the pneumatic spaces; it may extend into the tympanum; it may break through the posterior wall of the auditory canal; it may destroy the outer cortex of the mastoid, but seldom the tip. The tumor may lie for a long time under the skin and periosteum, without producing any change in the soft parts, if the growth happens to be one not infected. If infected, it will produce periosteal abscess, infiltration of the skin, and fistula. Frequently the tumor breaks through into the middle and posterior fossa of the skull, where it presses the dura and sinus out of the way. If not infected it may press on the contents of the intracranial cavity for a long time without producing symptoms; but if infected it is followed by some intracranial purulent process. The labyrinth and the facial canal may be affected after it has broken through into the tympanum, into the auditory canal, or on the external surface. The mass is most often seen in the tympanum, sometimes in the auditory canal. It is seen between the granulations and the fetid pus. It looks dirty white, or appears as pearl-like pieces broken off the tumor. These pieces should be easily distinguished from the inspissated pus of chronic inflammation. If these pieces are not found, or if the tumor does not project into the canal, this condition cannot be differentiated before the operation from ordinary chronic otorrhea, and when operating, such a cavity may be found from which a tumor has disappeared.

Rupture into the auditory canal may be followed by healing, and one may find the antrum, tympanum and auditory canal united in one cavity lined with epidermis. If the tumor has no broad way of escape, the danger of rupture into the intracranial cavity is greater than in any other form of purulent disease of the middle-ear and temporal bone. Sinus thrombosis is the most common complication following such rupture. Some cases are healed by the breaking through into the auditory canal, but most of them should have a radical operation performed as quickly as possible.

Breyre[1] describes a rare variety of cholesteatoma occurring independently of any inflammatory process. In the ordinary form of cholesteatoma he calls attention to the necessity of differentiating between dried inflammatory exudates and true cholesteatomatous masses.

Dundas Grant[2] thinks that when a radical operation for cholesteatoma is performed and a large cavity found lined by a homogeneous membrane, the operator might with economy to the patient's time and tissues leave that membrane *in situ,* simply scraping out the contents and sterilizing the lining with alcohol. It is understood, of course, that by the operation the antrum, attic, the tympanum and the external meatus are thrown into one large cavity. In several well marked cases he has found that this practice was followed by speedy subsidence of the discharge and satisfactory after-results.

## MASTOID DISEASE.

E. W. Pyle[3] makes a plea for more *conservatism especially in the treatment of acute mastoid diseases.* It is his opinion that the pendulum swing between conservatism and operative intervention has reached the latter extreme and that it is now time for the reaction to begin. To counsel delay with the use of antiphlogistic measures in acute mastoid inflammation is wiser than to encourage hasty operative procedures under mistaken conceptions. The truth of this is most apparent to those who see the result of inefficient surgery, and emphasizes the necessity for careful instruction in such measures as all can apply with reasonable celerity and exactness. In no other ailment is it more imperative to know the significance of early rest and medication to reduce arterial tension, the importance of paracentesis to unload obstructed capillaries, the value of the ice-coil to retard bacterial activity, the wisdom of thermal douching to prevent mural implantation, to relieve congestion, edema, and pain. In no other ailment is it more imperative to mitigate suffering for a

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(1) Revue hebdomad. de Laryngology, etc., Nov. 30, 1902.
(2) Lancet, 1900.
(3) Medical News, Jan. 18, 1902.

reasonable period of 24 hours. Even in recourse to analgesics the periosteal character of the pain and the fact that temporary relief is sometimes the beginning of convalescence should be borne in mind. While observing the patient, every local, general, and detergent effort should be made to abort operative necessities. The intelligent application of such is not so confusing as poor surgery, nor should an occasional failure establish a general abolition. [While conservatism is desirable and while it may be true that some surgeons are too ready to operate, there can be no doubt that for every case operated upon unnecessarily there are many sufferers from mastoid disease who would be greatly benefited by a properly performed operation.—Ed.]

B. A. Randall[1] believes that in the abortive treatment of acute mastoiditis, *heat is better than cold.* Out of 49 operations for acute mastoid lesions only 2 occurred under Randall's own care. One followed scarlatina and one grippe. This does not imply that most of the others might have been saved by skilful treatment, but he thinks it does bear out his contention that vigorous hot douching and such methods cannot be harmful as claimed by some authorities, since quite 600 acute suppurations—nearly 200 of them with mastoid tenderness, redness, and swelling—when first seen were so treated within the past two years, and three at most are known to have gone on to mastoid caries. Where the suppurative process, having reached or passed its acme, has brought the bony tissues to the verge of destruction, theory as well as abundant experience proves that heat is our best aid in combating the danger. This can best be applied by the hot douche in the canal, which carries the heat to and even through the affected tissues, supplemented by dry heat alternating with mere protection over the mastoid. Warmth and moisture may be deleterious, but heat pushed to the limit of tolerance should have all the constringent effect claimed for cold, while more conservative of the vitality.

**Indications for Opening the Mastoid Process.** The symptoms of mastoid disease in some cases are so plain and the indications for an operation so imperative that no question can be left in the mind of any one as to the propriety

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(1) Am. Jour. of Med. Sciences, April, 1902.

of operative interference. In other cases the need for an operation may be fully as great while the symptoms are obscure. The importance of these cases and the difficulty in arriving at a correct understanding of pathologic conditions within the mastoid process justifies the presentation of the views of a number of writers upon this subject.

The diagnosis of *mastoid disease associated with chronic suppurative otitis media* is sometimes exceedingly difficult. There is no doubt that it is present much more frequently than is suspected by the majority of physicians. W. S. Renner[1] recognizes this difficulty and makes the following group of symptoms, beginning with the easier cases to diagnose and going to the more difficult:

1. If one finds a fistulous opening on the external surface of the mastoid, extending into the bone and associated with a chronic discharge from the middle-ear, there is a destruction of that part of the bone extending to the antrum.

2. If a fistulous opening is found in the posterior superior wall of the auditory canal, associated with a chronic discharge from the middle-ear, one must decide whether this fistula is associated with destruction in the mastoid, and whether it leads to the antrum, or whether it is only superficial and due to an erosion of the bony wall of the canal, following a furuncle. If the bone defect exists on the outer wall of the attic, the disease of the bone may be confined to this place.

3. If a scar, due to a fistula, or to a previous operation upon the mastoid is found, associated with chronic otorrhea, it is quite probable that there is still disease of the bony wall of the antrum.

4. If pain in the ear, in a case of chronic otorrhea accompanied by tenderness on pressure over the mastoid, or swelling in that region is not due to a furuncle or retention of pus in the tympanum by some obstruction, such as polypi, it is due to a disturbance in the interior of the bone.

5. There are many cases of chronic otorrhea associated with disease of the bone in which there are none of the above-named conditions either of the exterior of the bone,

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(1) Buffalo Med. Jour., June, 1902.

or the auditory canal and yet the amount of bone destruction may be extensive.

P. Hammond[1] calls attention to the statement frequently made by general practitioners that they have never seen a case of mastoid disease even though they have been in practice many years. He thinks it is not that the disease is infrequent, but because the symptoms are obscure, and in many cases to be made out only by inspection of the ear by means of the speculum and reflecting mirror, that it is not more often detected. Because some years since mastoid abscesses were not commonly opened until there was an accumulation of pus between the bone and periosteum, this is the picture most often before the minds of many of us at the mention of the disease. We rather expect to see a certain amount of edema behind the ear, and perhaps fluctuation.

Fortunately for our patients, we are to-day enabled to detect the presence of extension to the mastoid long before it has reached this stage. Every patient who has an acute suppuration of the middle-ear should be carefully examined for evidences of mastoid involvement as symptoms may occur as early as the second day. It is a well known clinical fact that the absence of fever is no guide whatever. During the acute process in the middle-ear there is apt to be some elevation, but this entirely subsides with free discharge from the ear even though the mastoid be filled with pus.

Tenderness over the mastoid antrum is apt to be a better guide, but it must be remembered that this is often apparent only on deep pressure, and also that with some very thick bones we are not able to elicit tenderness.

In the absence of these two symptoms we are obliged to turn to an inspection of the conditions of the middle-ear. With an increasing collection of pus in the mastoid there will be a more pronounced bulging of the drum, and in many cases which give no evidence externally there will be almost a complete closure of the auditory canal from swelling of the wall nearest the mastoid. There is usually much pain with this condition, but in some cases and especially with phthisical patients, there is none. The presence of this increased swelling of the drum and poste-

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(1) Jour. Am. Med. Assoc., May 17, 1902.

rior canal wall is diagnostic of mastoid trouble, however, and it should not be allowed to persist long without operation.

E. B. Dench[1] believes that all cases of mastoid suppuration should be operated upon, and that when in doubt an exploratory operation should be performed.

The following points in the examination of *latent mastoid disease* are given by J. K. Love:[2]

In an acute mastoiditis there is not only pain on pressure, but very often pain apart from pressure, and spreading in almost every direction over the head, face and neck. But in these cases of latent mastoid abscess pain which the patient has hitherto known nothing of may sometimes be elicited on pressure. When it is present it is a valuable sign either that the cells contain pus or at least that the bone forming the mastoid process is inflamed. But the absence of pain does not negative the disease of the mastoid process or its cells.

If there be bulging on the upper and posterior wall of the external wall of the canal, and if here a probe enters and impinges on diseased bone, the mastoid cells contain pus and are discharging via the border cells into the external auditory canal. If granulation masses found in the middle-ear spring from the upper and posterior part of the cavity (opening of the aditus) the mastoid cells usually contain pus or granulation masses. This argument applies with greater force if these granulation masses recur after their removal and subsequent careful treatment of the middle-ear.

**Operation.** L. W. Dean[3] thinks it is not strange that success does not always attend work along the line of otitic surgery. No matter how careful the diagnosis, or how skilfully the operation is done, the location of the etiologic lesion is not always clear. Lesions may exist other than those made apparent through the grouping of symptoms, or the pathologic changes may have progressed so far as to preclude the possibility of successful issue. In performing the mastoid operation one must always see that a perfect connection is established between the antrum

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(1) Archives of Otology, April, 1902.
(2) Glasgow Med. Jour., July, 1902.
(3) Am. Medicine, May 3, 1902.

and the middle-ear, and in addition all of the cells of the mastoid must be opened. Quite frequently some of the cells in the tip of the mastoid may be affected, and if neglected they will cause future trouble and the operation will be practically a failure.

J. K. Love[1] offers the following conclusions regarding the tympano-mastoid operation for intractable chronic suppurative otitis media:

1. That all cases of old-standing disease of the middle-ear in which the discharge cannot be stopped by palliative treatment should be treated by operation, and by the radical mastoid operation if necessary.
2. That in performing the mastoid operation the routine treatment should consist of removal of the entire posterior bony wall of the external auditory canal, splitting the canal and turning the soft parts into the bony wound, stitching the mastoid wound closely, and conducting subsequent dressings through the split canal.
3. That there is no practical advantage in skin-grafting the tympano-antral cavity, except it be unusually large, when this proceeding may become of great value.
4. That for rapid and certain healing the prime conditions are removal of every vestige of disease, and the reduction of the tympano-antral recesses to one plain-walled, bony cavity, every part of which is easily accessible from the split external auditory canal.
5. The radical operation does not usually further impair the hearing.

In the radical or tympano-mastoid operation the *method of treating the post-auricular incision* has been the subject of much discussion. G. L. Richards[2] favors drainage through the auditory meatus with immediate closure of post-auricular incision. After the posterior superior bony wall has been removed, two parallel incisions are made in the skin after the manner of Koerner as shown in the accompanying illustrations.

Both of the incisions should be carried sufficiently into the concha so that the enlarged entrance to the canal will easily admit the forefinger, because if the entrance through the external canal is not made very large the final cicatri-

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(1) Glasgow Med. Jour., August, 1902.
(2) Laryngoscope, September, 1902.

cial contraction is such that sufficient room will not be allowed. This opening may be made as large as one desires, since the antitragus effectually covers any slight deformity in the ear due to an enlarged opening. The tongue flap being formed and any superfluous tissue trimmed away, the flap is laid back against the bare bone, and the external canal packed with gauze sufficiently firmly to hold the flap in position. The external wound is then completely closed by sutures.

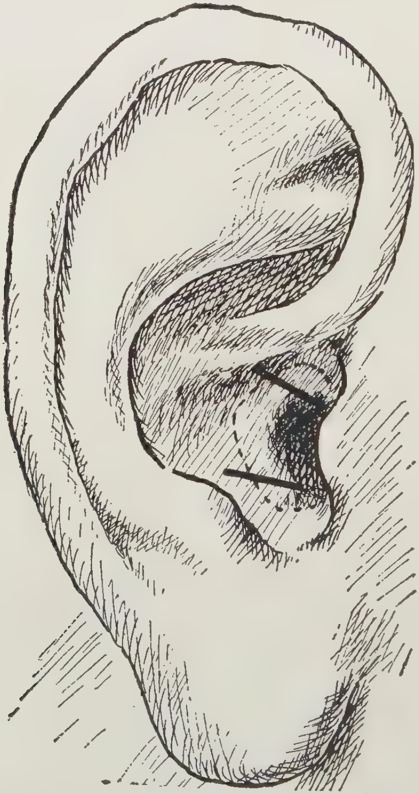

**Fig. 24.** Incisions in the concha as made for the plastic after the manner of Koerner.

The first dressing is made in from three to five days, although Koerner himself leaves his eight days. There is no special advantage in leaving the first dressing any longer than is necessary to allow the flap to become securely fastened. By the time the first dressing is made the flap is firmly attached to the denuded bone, and there are four surfaces which permit of epidermization. This allows rapid healing. This flap should be used only in cases in which one is absolutely certain that the bone against which the flap is placed is entirely sound; otherwise some point of diseased bone may be inclosed behind

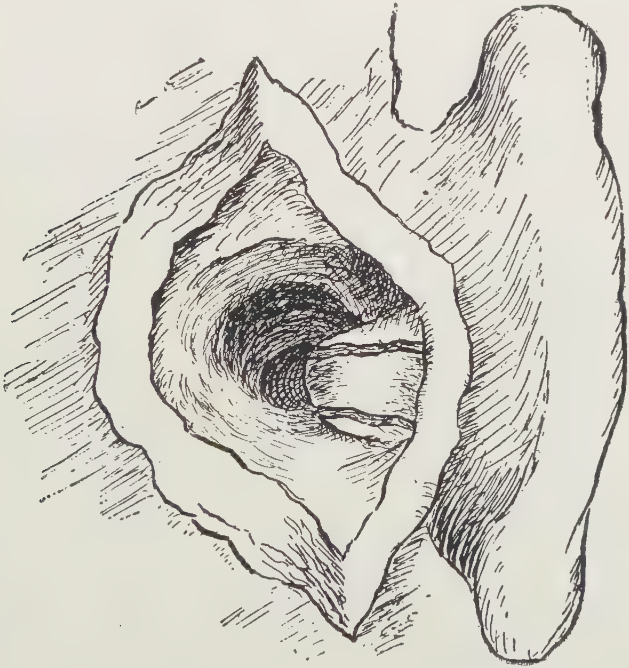
Fig. 25. Operation completed, and incisions made in the posterior canal after the method of Koerner, showing the formation of tongue flap. Wound ready for closing.

the flap, and subsequently break down. The advantages claimed for this plan are the simplicity of the after-treatment and the short time the patient must remain in the hospital.

[The Editor has used a modified Koerner flap with very satisfactory results. However, instead of holding the flap in position entirely by packing, he has caught the flap in one of the sutures closing the post-auricular wound. By producing some traction upon the flap a larger auditory meatus is maintained.]

In several cases in which the drum membrane was retained or in which it had reformed after the radical operation Matte[1] has found that remarkably good hearing followed when the *drum membrane became adherent to the stapes.* He therefore recommends in favorable cases where the hammer must be sacrificed that the drum membrane should be retained as far as possible and that efforts should be made to cause its adhesion to the stapes during the after-treatment.

R. Lake[2] reports a case of necrosis of the osseous labyrinth. The patient, a man 54 years of age, had had discharge from the left ear for 50 years. During an acute exacerbation of a mastoid inflammation an operation was performed. Six months after the operation the ear was apparently well. During the progress to health the auditory meatus had been gradually obliterated. Soon afterward the discharge began again, pain returned and facial paralysis followed. A later operation developed the facts that the entire labyrinth was necrotic, but the facial nerve was apparently intact. In removing the sequestra the facial nerve was torn in two. The labyrinth was removed in two sections, one consisting of that part of the bony labyrinth which contains the external and superior semicircular canals, the vestibule and a part of the internal auditory meatus. The other sequestrum consisted of both the osseous and membranous cochlea. After the removal of these sequestra there was a cavity at the bottom of the wound which would easily admit the tip of the index finger.

A. L. Whitehead[3] has used *adrenalin chlorid in mastoid*

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(1) Archiv für Ohrenheil., Bd. 53.
(2) Jour. Laryngology, Rhinology and Otology, March, 1902.
(3) Jour. Laryngology, Rhinology and Otology, May, 1902.

*operations.* It is especially valuable in the secondary skin grafting operation. There is no reaction hemorrhage, and the graft appears to do as well in these cases as in those cases in which the adrenalin chlorid was not used. On account of its effect upon the hemorrhage much time can be saved by its use.

E. Greuning[1] reports a case of *herpes-zoster* in connection with mastoid disease.

A case of *mastoid abscess with total loss of both eyes* is reported by E. W. Day.[2] Five days after the operation for a Bezold's mastoid abscess of the right side, the patient's right eye was found swollen, the lids slightly discolored, and the tissue tense from pressure. The eyeball was pushed forward by pressure from behind. The swelling continued until the eyelids could not cover the front of the eye. Search was made for pus in the orbit but no abscess was found. Ten days later ulceration and sloughing of the cornea occurred with loss of the contents of the eyeball. Thirteen days after the right eye was affected, the left eye became involved and pursued a similar course. The patient recovered but the exact cause of the eye trouble was never clearly determined, although the physicians in attendance believed that it had been due to a thrombosis of the cavernous sinus.

M. D. Lederman[3] reports a case in which pain recurred in the region of the mastoids three months after an extensive tympano-mastoid operation. The discharge ceased and the wound had been perfectly dry for some weeks. Examination of the ear showed that the membrana tympani had reformed, and that there were granulations in the posterior wall of the attic. After removal of the membrane the granulations disappeared, and the membrane partially reformed. After recovery in this case the hearing was much better than before the operation. The watch could be heard 15 inches, and the whisper about 12 feet.

Stanculaneau and Depoutre[4] emphasize the importance of clearing out the posterior group of mastoid cells as well as those in the tip of the mastoid. Because of their close

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(1) Jour. Laryngology, Rhinology and Otology, May, 1902.
(2) Annals of Otology, Rhinology and Laryngology, August, 1902.
(3) Laryngoscope, January, 1902.
(4) Annales des Maladies de l'Oreille, October, 1901.

proximity to the lateral sinus, and to the meninges, they are of special clinical importance.

There is little excuse for facial paralysis resulting from the mastoid operation, according to B. A. Randall,[1] if reasonable care is exercised. When caries already surrounds the nerve it is fair to claim that the paralysis was precipitated rather than caused by the operation, for the lesion would generally have spontaneously occurred, and all too often would have proven more persistent. Surgical paralysis is generally cured in from six to twelve weeks. If we avoid too tight packing, which may press injuriously upon it in the upper part of its course, and in removing the back wall of the canal go no lower than the middle of the tympanic margin, there should be little risk. To watch the face for evidence of irritation of the facial should be merely an adjuvant to the more surgical plan of knowing where one is and what he is doing, with avoidance of the well-defined path of the nerve.

In the tympano-mastoid operation, R. Payne[2] thinks the *inner wall of the middle ear* should be left carefully alone and that great care should be exercised not to interfere with the stapes. If this surface requires treatment it can be attended to later as the wall is in plain view. Payne secures much better hearing by this plan than when the wall is curetted, as is often advised.

A series of 100 mastoid operations performed at the Manhattan Eye and Ear Hospital is tabulated by T. J. Harris, with the purpose of showing:

1. The stay in hospital after operation.
2. Temperature after operation.
3. The number of days of elevated temperature.
4. The day of highest temperature.
5. The character of the temperature curve.

In each case the record was carefully examined, and only simple, uncomplicated cases selected. This threw out all cases with brain or sinus complication; all with gastro-intestinal or bronchial complication; and any cases in

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(1) Am. Jour. Med. Sciences, April, 1902.
(2) Annals of Otology, Rhinology and Laryngology, August, 1902.

which the notes showed unusual or excessive discharge from the wound.

An analysis showed the following results:

1. In only one case was there a perfectly afebrile temperature.
2. The average length of stay in the hospital after operation was 14.8 days. This does not mean that healing took place in that time, but that the case made such favorable progress toward recovery that it could be transferred to the outdoor department.
3. The average duration of the post-operative temperature was 6.65 days, the range being from 2 to 19 days.
4. The greatest elevation of temperature occurred in 56 cases, or over one-half, on the second day; in 29, on the third day; and in the remaining 15, on the fourth day or later.
5. In 28 the highest elevation ranged from 99-100° F., in 39 from 100-101°, in 23 from 101-102°, in 6 from 102-103°, in 4 from 103-104°.

In 90 per cent of the cases, the elevation of temperature did not exceed 102°; and in 67 per cent or over one-half, fell under 101°.

These statistics suggest, among others, the following comments: (a) They represent the work of not one, but at least ten, surgeons. (b) The notes of the house surgeon refer repeatedly, even in the cases with the highest temperature, to no complaint from the patient, but that "he slept well," "wound looked healthy," etc. The fact that the highest elevation of temperature so generally occurred on the day following the operation decisively disposes of the theory that it was due to retention of pus and need of dressing; and while it is a common view to ascribe it to acute infection from the bowels, and to expect a fall from the use of a cathartic, this belief rests on no secure basis.

**Hysteria.** Gellé[1] reports a case of *mastoid pain due to hysteria.* A girl 18 years of age had received a severe mental shock, and after exposure to wet weather had severe mastoid neuralgia. Ten days after the operation the pain returned. The auricle and right side of the pharynx were hypersensitive. The slightest touch with cotton-wool

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(1) Archives Internationalis de Laryngologie, etc., January-February, 1902.

caused intense pain. None of the classic symptoms of middle ear disease were present. After local applications of glycerin, and by suggestion, the case greatly improved.

## OTITIC BRAIN DISEASES.

S. Oppenheimer[1] has made a careful study of the *venous system of the temporal bone* and its relation to the complications of mastoid disease. He believes that while the majority of the complications of mastoid necrosis are the result of infection through direct destruction of tissue, yet many cases of sinus phlebitis, brain abscess, and meningitis are directly traceable to infection by way of the small venous channels of the temporal bone. A further study of these venous channels, of which but little is now known, he is confident will elucidate many obscure points in the complex problem of these complications.

**Cerebral Abscess.** A case of *abscess of the temporosphenoidal lobe* due to ear disease is reported by R. Lewis, Jr.[2] The principal symptom of brain abscess was a well marked amnesic aphasia. The patient was unable to name objects, but could tell their use. During the mastoid operation the pus kept oozing out from the region near the antrum, and, on exploring with a probe, there was found a fistulous opening that led from the tegmen tympani for some distance into the cranial cavity. On the removal of the tegmen 2 or 3 drams of foul-smelling pus flowed out. The posterior upper wall of the external auditory canal was removed, the tympanic cavity was thoroughly curetted, and all granulations and remnants of necrotic ossicles were removed. The greater part of the squamous portion of the temporal bone, together with some of the anterior border of the parietal bone, was removed. The exposed dura was blackish in spots, and everywhere covered with lymph or bathed in pus. This extradural abscess was situated fairly far forward and was spread out over that part of the dura which covered the temporosphenoidal lobe. At the same time it was walled off, by adhesive inflammation, from the healthy dura. It was

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(1) Medical Record, Aug. 23, 1902.
(2) Medical Record, March 15, 1902.

at this point, where the tension of the dura was greater than normal, that an incision was made into the brain to a depth of about three-quarters of an inch in an upward and forward direction. The incision afforded escape to some disintegrated brain material and pus. Exploration revealed the fact that the abscess cavity was about the size of a large walnut and was lined with a distinct membrane.

Syringing was not resorted to, but instead the cavity was wiped out with pledgets of gauze. An annoying hemorrhage occurred from one of the meningeal vessels. Sterile gauze packing was used. Sutures were employed for closing the upper portion of the wound. Firm pressure by means of dressings and bandages was applied. The operation lasted one hour and fifteen minutes, and was followed by little or no shock. The temperature after the operation was 98.4° F., pulse 100 and of good volume and strength. During convalescence the temperature never went above 100° F., nor below 98° F. For a period of about one week following the operation the patient was restless and, at times, nauseated, and she suffered somewhat from retention of urine. Twelve weeks after the operation epidermization of the tympanic cavity had taken place, and the external wound had entirely healed. The patient's general physical condition, she stated, had never been better.

D. B. Lees[1] reports two cases of *abscess of the temporosphenoidal lobe* presenting no lesion in the ear. In each case a small area of necrosis of the petrous bone was found but the middle ear appeared to be perfectly healthy. Lees considers it probable that the infection, in one case at least, was due to streptococcus pyogenes, and probably was conveyed to the petrous bone, and to the brain through a transient otitis externa. The patient was a girl 21 months old. Three months before admission to the hospital she had suffered from vomiting, would put her hand to her head and cry out. For three weeks before admission she had lost the use of her limbs, a condition which was ushered in by a convulsion. The child was drowsy, with bulging fontanelle, and presented a left-sided hemiplegia. A double internal squint subsequently appeared,

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(1) Lancet, May 3, 1902.

but no optic neuritis. Death occurred after one month. A post-mortem examination disclosed an abscess about the size of a hen's egg in the right temporo-sphenoidal lobe, with tough walls and containing a thick greenish pus. Some basic meningitis was also present. The brain and membrane were adherent to the right wing of the sphenoid, and the right petrous bone showed a small patch of disease about the size of a three-penny piece above the tympanum. The middle ear on this side was healthy and the membrana tympani was clear and thin. Otherwise the body showed no abnormality.

**Cerebellar Abscess.** A. Knapp[1] reports a fatal case of cerebellar abscess in which the infection had reached the cranial cavity through the labyrinth and internal auditory canal, producing a pachymeningitis with adhesion of the cerebellar tissue. a cerebellar abscess in the flocculus which in turn ruptured into the 4th ventricle. Three operations were performed in the effort to relieve the successive symptoms as they arose. At the first operation the original site of the disease was removed and the labyrinth freely opened. The latter structure contained no pus but discolored granulations. The operation seemed successful, except for the continued fever, the presence of pain over the left eyebrow and insomnia. Then very suddenly very severe earache, nausea, slight facial paralysis and nystagmus set in. As the labyrinth had unquestionably been affected for some time without causing any typical signs (except deafness) it seemed proper to search for an extension from the labyrinth and possibly a deep-seated extradural abscess before the meningeal symptoms became pronounced. This was done; the posterior and superior surfaces of the petrous bone surrounding the semicircular canals were exposed and appeared healthy, nor could any fistula be found. No particular change in the symptoms occurred until, on the sixth day, the pulse-rate which had been 120, dropped to 80, the temperature remaining high, and increasing stupor set in. Lumbar puncture was almost negative, *i. e.*, the fluid evacuated was practically clear. These three features strongly suggested an abscess, and, from the nature of the infection, one presumably situated in the cerebellum,

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(1) Archives of Otology, April, 1902.

near the internal auditory meatus. An attempt was made to get as near to this region as possible; the entire bony labyrinth was removed, the cerebellar dura was broadly exposed and incised, and the cerebellum was freely punctured, but without success. At the autopsy the abscess was found in the flocculus at a point internal and anterior to the internal auditory meatus.

**Meningitis.** A case of otitic pyemia with suppurative choroiditis of the opposite eye, and later meningitis and death, is reported by Thomas.[1] Two weeks after a mastoid operation, the ear became painful and a diagnosis of osteo-phlebitis was made, but before operative interference was undertaken, a suppurative choroiditis developed. A few days later symptoms of meningitis began and the patient died five and one-half weeks after the mastoid operation. Thomas believes that the choroiditis was due to infection carried to the eye by the blood, and that afterward the infection traveled from the eye to the meninges. P. de Santi[2] reports a case of complete bilateral deafness, and left facial paralysis due to basal meningitis probably of septic origin.

A case of *extradural abscess with meningitis and death* following a chronic purulent otitis is reported by A. Knapp.[3] The patient, a man 34 years of age, had suffered from left suppurative otitis media for 20 years. He complained of pain about the ear and over the left eyebrow, and vertigo, and had a very offensive discharge. The middle ear cavities were exposed according to the Zaufal-Küster method. The bone was eburnated. The antrum contained pus and granulations. After completing the removal of the posterior canal wall, a reddish fibrous structure was exposed, which could be followed into the aqueductus Fallopii, passing over the oval window; it was the inflamed facial nerve. There never was any facial convulsion. The oval window could not be identified. A modified Panse plastic was done.

The subsequent course was uneventful except for pain referred to the back of the left ear and extending down the neck. The pain diminished later, but the patient was

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(1) Revue hebdom. de Laryngology, Jan. 11, 1902.
(2) Jour. Laryngology, Rhinology and Otology, May, 1902.
(3) Archives of Otology, October, 1902.

often restless at night. There was facial paralysis. The temperature remained at 100° for three days and then became normal. The wound healed smoothly.

At the first operation the only complication found was a defect in the aqueductus Fallopii and an inflamed facial nerve. The pain behind the ear, of which the patient complained after the operation, was undoubtedly due to the extradural abscess, but as it seemed to diminish and was unaccompanied by other symptoms nothing was done until on the twelfth day after the first operation, when the patient suddenly became very much worse and the temperature rose to 104°, went down to 101° in the evening, and on the following day was 105.3°. The presence of an intracranial complication was now very apparent, and from the position of the pain and the type of the fever it was probably situated in the posterior cranial fossa, near to and with likely involvement of the sinus. The sinus was exposed but found healthy. A short distance internally to it a well-defined extradural collection of pus was evacuated and a small perforation found in the dura from which cerebro-spinal fluid escaped. Meningitis had, however, already set in, for on the following day a paralysis of the external rectus, delirium, and other symptoms appeared. A small area of discolored bone was seen at the juncture of the inner and posterior walls of the antrum, posterior to the external semi-circular canal, without any sign of a fistula, which might have been the original path of infection from the antrum. The extensive changes found on the inner tympanic wall, with the loss of hearing and absence of vertigo and nystagmus, certify a disease of the labyrinth of non-recent date. The internal auditory meatus and the other paths of infection usually traversed by a labyrinthine suppuration were unaffected.

**Involvement of Gasserian Ganglion.** R. Hilgermann(1) reports six cases of *involvement of the Gasserian ganglion* in middle ear suppuration. In some of the cases the diagnosis was made before death, while in others the condition was revealed by autopsy.

The following case is selected as fairly typical: W. M., thirteen years old, had, after measles, at age of four, a discharge from the left ear. During the last two weeks the otorrhea was accompanied by headache, fever, vomiting, vertigo, with a tendency to fall to the right. On admission the temperature was 39.8° C. and the pulse 88° to 100°. The head was held more or less in a fixed position, though all movements were passively possible without pain. The anterior and posterior margins of the mastoid were very tender, as well as the insertion of the sterno-mastoid muscle; the canal was filled with fetid pus which accumulated rapidly.

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(1) Archives of Otology, August, 1902.

**Operation.** The antrum was opened and the mastoid cells were found filled with pus; the antrum contained pus and granulations; the tegmen tympani seemed solid; the sinus and dura of the middle fossa were exposed; both appeared healthy, though the bone on the posterior surface of the antrum appeared softened. The sinus was incised, but contained fluid blood. Distinct rigidity of the neck continued; high fever and other marked meningeal symptoms ensued, and the patient died the following afternoon.

**Autopsy.** Extensive meningitis; sinus free. On examining the apex of the pyramid, the Gasserian ganglion was found bathed in pus. On retracting the dura in the region of the fovea, the dura could not be recognized as such, but was replaced by soft granulations. At this place a very delicate connective-tissue band, perhaps a nerve, perforated the bone and passed into a cavity mentioned below. The ossicles were normal and imbedded in hypertrophied mucous membrane. From the floor of the hypo-tympanic recess a system of pneumatic spaces filled with pus and granulations passed inward between the jugular fossa and labyrinth, then proceeded inward and forward to the apex of the pyramid. The previously mentioned thin area of bone at the fovea trigemini corresponded to the inner wall of a large air cell which surrounded the carotid canal and was filled with pus. Evidently the inflammation passed along the delicate fibrous band to the cavity of the Gasserian ganglion.

**Otitic Sinus Disease.** Arnold Knapp[1] reports a case of *purulent phlebitis of the sigmoid sinus without thrombosis.* A patient with unquestioned pyemia of aural origin, having two or three chills a day, at operation presented an

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(1) Archives of Otology, October, 1902.

enormously distended sinus with a thin but healthy anterior wall; the sinus contained fluid blood. The sigmoid sulcus was normal. The bone posterior and external to the horizontal semicircular canal seemed unhealthy, and the neighboring dura was covered with apparently healthy granulations. The pyemic condition, though improved at first, continued; the swelling in the right suboccipital triangle became circumscribed. At the second operation the floor of the occipital bone was explored to no purpose, and as the bone near the labyrinth seemed unhealthy this was further resected. No new lesion was found. The lateral sinus still contained fluid blood. The jugular vein was ligated. The patient's condition grew steadily worse; meningitis became more marked, and led to the patient's death.

At autopsy meningitis was found and an unusual condition of the sigmoid sinus. The descending portion was enormously distended, the anterior wall was very thin but healthy. The posterior wall was thickened, measuring 6 mm., all of the coats of the venous wall were infiltrated, the central wall was red and the part projecting into the lumen was gray and rough, apparently necrotic. Microscopic examination of the sinus wall revealed the presence of granulation tissue, showing that the process was of some duration and tissue repair had been attempted. This infiltration extended down through the bulb to the beginning of the jugular vein, thus accounting for the deep suboccipital induration. The cerebellar surface of the dura appeared perfectly healthy. The sinus contained a recent blood-clot. The infection presumably extended from the aural wall posterior to the horizontal semi-circular canal to the dura, causing pachymeningitis, then involving the posterior wall of the sinus, the anterior remaining healthy. It is difficult to account for the extreme distention of the sinus wall, unless we assume a congenital anomaly.

In all mastoid operations when the temperature of the patient has indicated serious systemic infection, E. B. Dench[1] is in the habit of exploring the lateral sinus. He formerly used a large aspirating needle but found it unreliable, as in some instances where infection of the sinus

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(1) Am. Jour. Med. Sciences, May, 1902.

had taken place, and where a clot was present, the exploring needle withdrew fluid blood. He has, therefore, within the last few years abandoned this procedure entirely; and in every case where he is in doubt as to whether or not the sinus is normal, has made a free incision through the sinus wall. Previous to this exploratory incision every purulent focus must have been removed from the mastoid process—that is, the mastoid antrum must have been thoroughly cleaned out, and all pneumatic spaces must have been broken down and curetted, so as to avoid any possible infection of the sinus as the result of the exploratory opening. After this has been done, the antrum is packed off by means of iodoform gauze, and the entire field of operation thoroughly cleansed before opening the sinus. All instruments are also carefully re-sterilized before this exploratory incision is made.

Before making an exploratory incision into the sinus wall it must be borne in mind that the sinus must be exposed by removing the bony covering of the sigmoid groove for a distance of at least three-quarters of an inch. Pressure is then applied to the sinus above, and the sinus wall is incised close to the knee by means of a sharp, straight bistoury. This incision should lie at about the middle of the area of sinus exposure. If there is a clot in the sinus at this point there will either be no hemorrhage at all or a very slight hemorrhage from below. A curette is then passed into the lumen of the sinus and the clot removed, so that free bleeding is established from below. Pressure is now applied at the point of incision in the sinus and the pressure from above it removed. If free hemorrhage does not occur from the direction of the torcular a curette is introduced in this direction, and the lumen of the vessel thoroughly curetted until free hemorrhage is established, it being imperative that free hemorrhage be established from the upper end of the sinus, excepting in those cases where the lumen of the vessel is occluded by a firm fibrinous clot which has evidently been in position for a long time and has become thoroughly organized. Where such a condition is found, and where the lumen of the vessel seems to be obliterated, and the entire vessel has been converted into a mass of connective tissue, it is then unwise to attempt to break down this firm plug in the upper portion of the sinus. If the clot has become firmly organized no further infection can result from it. Where free hemorrhage is established both from the upper and lower angles of the sinus wound, or where the upper portion of the vessel seems to be firmly occluded by an organized clot and there is moderate bleeding from the lower angle of the wound, it is not deemed advisable to institute a more radical procedure at the time of the primary operation. Hemorrhage should be controlled by firmly packing the sinus wound by means of iodoform gauze, and shutting off the sinus area from the middle-ear and adjacent mastoid cells by means of a firm packing of iodoform gauze. Such a dressing will remain in position from four to six days, and there is no indication for its removal unless there is a sudden rise of temperature to 103° or 104° F.

If all suspicious cases are treated in this manner at the time of primary operation, and if, whenever there is any doubt as to a possible involvement of the sinus, this vessel is opened for the purpose of exploration, it is safe to say that no unfavorable issue is to be expected. On the other hand, if, after a period of from one to three days, the temperature shows any indication of systemic infection, it is advisable to proceed immediately to prevent absorption of the poison by means of excision of the internal jugular vein.

In considering the indications for and against *ligation of the internal jugular vein* in cases of otitic sinus thrombosis, H. Jones[1] offers the following conclusions: 1. Where the clot in the sinus is firm at both ends, though broken down in the middle, and there is little or no cord in the neck, it is sufficient to remove so much of the clot as appears to be undergoing disintegration and to treat the sinus as an open-wound. 2. Where there is no cord in the neck, but on exploration the sinus is found to be permeable though obviously infected, whether lung complications exist or not, the surgeon should obliterate the sinus and tie and divide the vein. 3. Where the sinus has been cleaned out but the vein has not been tied, and the pyemic symptoms continue or recur it is necessary to consider carefully in which direction in the sinus the ex-

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(1) Lancet, Aug. 23, 1902.

tension is occurring. If it is occurring toward the torcular, while the bulbar end continues sound, there is nothing to be gained by tying the vein; if the torcular end is sound whilst a cord is forming and spreading down the neck, whether lung complications have set in or not, the vein should be tied and divided.

A case of recovery from sinus thrombosis, without removal of the clot from the bulbar end, and without ligation of the internal jugular vein, is reported by C. J. Kipp.[1] A woman about forty-five years of age had an otitis of about five weeks' duration with profuse discharge and great pain in the mastoid region. Posterior superior wall of canal red and much swollen. The antrum was filled with pus and granulations. A fistula extended towards the lateral sinus, the bony covering of which was discolored. On removal of this, the lower part of the sigmoid sinus was found to be of a yellowish color, not unlike wet leather, while near the knee it was nearly normal in appearance. Incision of the sinus caused escape of a quantity of purulent fluid; near the knee a disintegrated thrombus filled the sinus. After the removal of the thrombus with a sharp spoon, there was free bleeding, which was stopped by pressure. From the lower end of the sinus a good deal of purulent matter was removed, with spoon, but all efforts to establish communication with the bulb were futile. Careful palpation of the region of the internal jugular vein showed this to be normal. This discolored outer wall of the sinus was not cut away, but the sinus tamponed with iodoform gauze. The internal jugular was not ligated, as the patient showed signs of collapse. For a week after the operation the temperature ranged between 99° and 100°. After that it gradually rose to 103° in the evenings. At the same time the patient complained of pain in the right gluteal region and on examination a large abscess was found here. After opening the abscess, the temperature fell to normal and remained so. Since then the patient has had no further trouble. The wound closed entirely in about two months and she is now in perfect health. The case is thought worth reporting, as it shows that recovery took place without ligation of the internal jugular vein in a case in which the sinus contained fluid pus and was occluded near the bulb

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(1) Archives of Otology, December, 1901.

by a thrombus presumably infected by contact with the purulent fluid. It also shows that resection of the disintegrated walls of the sinus is not always essential to speedy recovery. That the development of the gluteal abscess would have been prevented by the ligation of the jugular or the excision of the diseased wall of the sinus is not probable.

In *pyemia from thrombosis of the lateral sinus,* due to middle ear disease, M. Lermoyez[1] thinks the internal jugular should be ligated, before the lateral sinus is opened. He warns against the indiscriminate use of iodoform. When iodoform is used and pyemic symptoms follow the operation, he advises an examination of the urine, as the symptoms of iodoform poisoning may be mistaken for pyemia.

## INTERNAL EAR.

Dundas Grant[2] thinks sufficient attention is not given to diseases of the internal ear. He calls attention to the difficulties encountered in diagnosis of these lesions, and states that diminished bone conduction, and negative Weber and positive Rinne when met with in association afford typical evidence of nerve deafness, if the impairment of hearing is well marked. When nerve deafness is accompanied with middle-ear disease, Rinne is negative, Weber may be positive and the diagnosis may depend upon the diminution of bone conduction. These cases have an acute onset, are usually inflammatory and occur frequently in the course of infectious diseases. The forms of nerve deafness having a catarrhal development are anemic and congestive, and they are to be carefully differentiated.

In congestion there are usually collateral evidences of plethora. The patient's symptoms are worse on lying down, or after the ingestion of food, or before the occurrence of the menses; they are made worse by the inhalation of nitrite of amyl, and are relieved by compression of the vertebral arteries, and in anemia on the other hand all these signs are reversed, and the constitutional signs

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(1) Annales des Maladies de l'Oreille, etc., January, 1902.
(2) Jour. Laryngology, Rhinology and Otology, April, 1902.

of this condition are present, though sometimes to a very slight degree. In some cases the findings are those of anemia at one time, and congestion at another. Grant attributes this to irregular nerve control of the vascular supply which is the rule in neurasthenic conditions. The treatment required follows as an obvious sequence to the diagnosis. Among other types are the senile changes which normally begin to show themselves after the age of sixty, chiefly by a loss of hearing for the highest pitched tones, and occupation deafness, the form occurring typically in artillerymen and boilermakers; it also attacks the left ear in those who do much rifle shooting, and results from exposure to noises. Toxic nerve deafness is frequently exemplified in the dulness of hearing produced by quinin or salicylic compounds, and is probably congestive in nature. The neo-martial is an occasional form of nerve deafness comparable to amblyopia of young husbands described by Jonathan Hutchinson. Neurasthenia often gives rise to a form of nerve deafness in which the deficiency is not especially marked for the highest pitched tones. It is sometimes produced by overwork, excessive worry and strain of active military service and other analogous causes.

Hysterical nerve deafness is probably sudden in onset, but when affecting only one ear the patient may at first be unconscious of its occurrence, and on its discovery may be unable to state either the mode or date of onset.

The treatment of nerve deafness primarily depends on the diagnosis of the variety and the necessity of distinguishing between anemic and congestive forms again must be emphasized. That valuable drug, pilocarpin, has fallen into undeserved disuse through its unfortunate effect in cases for which it was not adapted. It is a most beneficial remedy in congestion of the labyrinth, but most deleterious in the anemic condition. It may be administered hypodermically or by the mouth. The initial dose by the skin is about one-twelfth of a grain. At least double this dose is necessary for internal administration. The other general remedies calculated to deplete are also advisable in cases of congestion. In anemia and conditions of exhaustion, our sheet anchor is strychnin, and when such doses have been reached as to produce twitching or other nervous disorder, the remedy may be combined with chloral.

Iron and chlorid of ammonium are also of value, and in neurasthenic conditions, arsenic may be added.

V. Hinsburg[1] believes that *suppuration of the labyrinth* outnumbers all other complications of suppurative middle-ear disease, but as yet our knowledge of the subject is comparatively limited. He states that the labyrinth may become infected in a number of ways: from the blood, from the cranial cavity, and from the middle-ear. Only the last mode of infection is considered in this article. Open pathways, such as lead from the cranial cavity to the labyrinth, do not exist between the latter and the middle-ear. The two openings in the osseous labyrinth wall—foramina rotundum and ovale—are closed by membranes which resist the progress of an infection as strongly as the osseous wall itself. Politzer has shown the existence of anastomoses between the blood-vessels of the middle and internal ear, suggesting the possibility of an infection through these channels. But Hinsburg has failed to find a single case in literature where a suppuration of the labyrinth was found to have been caused in that way. Hinsburg assumes, then, that a labyrinth infection from the middle-ear is only possible through a perforation of the labyrinth wall.

The perforation may be of traumatic origin. Fractures of the base of the skull are apt to extend through the petrous bone, with or without rupture of the tympanic membrane. Thus the way is opened for the immigration of microorganisms from the external ear or from the Eustachian tube. Occasionally injuries occur acting directly on the labyrinth wall, knitting needles being most commonly reported as the cause of the accident.

Under the head of traumatic lesions should be considered those caused by operations, the labyrinth being opened either intentionally or accidentally: the former seem to be attended with less danger. Of all the reported cases of extraction of the stapes, only one developed symptoms suggestive of labyrinthine infection.

The numerous fatal cases where meningitis followed the unskilful attempt at extraction of foreign bodies are mostly due to a perforation of the labyrinth wall. The

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(1) Archives of Otology, April-June, 1902.

frequency of such occurrences cannot be stated even approximately, as the majority of cases are not reported.

Far more frequent than these labyrinth infections of traumatic origin are those which are due to the destructive action of middle ear suppuration.

In 61 cases out of 198 cases collected the manner of infection was determined as follows:

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|---|---|
| Fenestra ovalis | in 17 cases |
| Fenestra rotunda | in 2 cases |
| Fenestræ rotunda and ovalis | in 3 cases |
| Fistula in horizontal semicircular canals | in 27 cases |
| Fistula in posterior or superior canals | in 5 cases |
| Fistula of promontory | in 7 cases |

Dundas Grant[1] reports a case of *neurasthenic nerve deafness.* Less work, the habit of eating less, and a slight amount of stimulants brought about a decided improvement in hearing and a lessening of the other symptoms of neurasthenia.

G. MacDonald[2] reports a case of Ménière's symptom complex cured by electricity. He recommends galvanism in such cases before administering quinin or other medicine.

## MISCELLANEOUS.

**Tinnitus Aurium.** P. H. Kerrison[3] discusses the subject of *tinnitus aurium* under five divisions according to its cause, as follows:

1. Conduction sounds, or noises due to occlusion, or impaired mobility of some portion of the sound-conducting apparatus.

2. Blood sounds, or noises produced by the blood current in vessels in or near the ear, and due either to disturbances of the local or general circulation, or to abnormalities in the size, shape or position of the vessels.

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(1) Jour. Laryngology, Rhinology and Otology, May, 1902.
(2) Wiener klin. Wochenschrift, Nov. 21, 1901.
(3) Laryngoscope, December, 1901.

3. Labyrinthine sounds, or noises due to alterations—either of increase or diminution—of the pressure within the labyrinth.

4. Neurotic sounds, or noises due to increased irritability of the auditory nerve.

5. Cerebral sounds, or noises due to lesions of the auditory centers in the cerebral cortex.

Conduction sounds are those due to occlusion of the external auditory meatus and to impaired mobility of the ossicular chain. Whenever air conduction is impaired, bone conduction is increased, and it is practically certain that sounds produced by normal physiologic processes within the body, hitherto unheard, now become distinctly audible.

Even when the structures of the hearing apparatus are perfectly normal certain congenital abnormalities or pathologic conditions of the circulatory system may produce subjective noises.

The so-called blood sounds may be of arterial or venous origin. They may be dependent upon anatomic anomalies and not upon any pathologic condition, in which case they are not to be looked upon as a symptom of disease, and are often not amenable to treatment. The close relation, for example, of the internal carotid artery and the internal jugular vein to the tympanum is well known. The anterior wall of the tympanum is separated from the internal carotid by a thin, bony plate only, and the tympanic floor is in relation with the jugular fossa, which lodges the bulb of the jugular vein. As an abnormal congenital condition the carotid canal may project into and encroach upon the cavity of the tympanum, and it is not difficult to conceive that any malposition in this direction might give rise to sounds which the patient could not fail to hear. In the tympanic floor, also, dehiscences may exist either as a congenital defect or as a result of an old necrotic process which has undergone resolution. Many such cases have been observed during surgical operations, and in the course of post-mortem examinations.

Another variety of blood sounds, not dependent upon aural disease, may occur as a result of disturbances in the general circulation, which may be temporary or more or less persistent in character.

A more persistent form of tinnitus, which may also seem to indicate circulatory derangement, is that which may accompany visceral disturbances in other parts of the body. It is a well recognized fact that visceral disorders—notably disorders of the pelvic and abdominal viscera—frequently produce aural symptoms.

In certain disorders of the stomach, also, impulses may be sent by way of the inferior cervical ganglion to the labyrinth, whereby its arteries are caused to dilate. Woakes claims that under such conditions the blood supply to the area involved "may be ten times as great as" under normal conditions. With this theory in mind it is no tax upon credulity to accept the statement that "cases of tinnitus from constipation, subacute gastritis and pathological conditions within the pelvis are of common occurrence."

In such cases it would be logical to expect the tinnitus to yield to treatment directed against the existing visceral disorders.

Patients with chronic endocarditis form another class occasionally suffering with tinnitus. When with chronic valvular disease, a murmur heard objectively at the base of the heart, is transmitted to the vessels of the neck, an accompanying tinnitus may be clearly due to transmission of the cardiac murmur.

Blood sounds are usually of low or medium pitch, and are diagnosed by their character and by the exclusion of other causes. Pulsating noises are of arterial origin, whereas venous sounds are uniform or non-pulsating in character.

There should also be mentioned a venous blood sound, which sometimes occurs with chronic or long continued anemia. The diagnosis depends upon the character of the sound; the absence of tympanic disease; exclusion by functional tests of labyrinthine disease; and evidences of anemia as shown by general symptoms and examination of the blood.

Remembering, then, the finely balanced pressure relationship between the end organs of the nerve and the surrounding structures, it is not surprising that any marked variation of the pressure within the labyrinth—whether of increase or diminution—may produce changes in the condition of the nerve so appreciable as to act thereon as a veritable mechanical irritant.

Neurotic sounds.—Those subjective noises may be classed as neurotic sounds which depend upon some abnormal condition of the auditory nerves. The tinnitus in most of these cases is to be regarded as a pure neurosis, *i. e.*, it is dependent upon a functional disorder of the nervous system in which the auditory nerves share and sympathize. They may present no evidence of organic disease, yet are shown to be in a condition of increased or abnormal irritability.

This condition of acoustic hyperesthesia may be produced by toxic matters circulating in the blood, which act as irritants upon the auditory nerves. In this way may be explained the temporary tinnitus occurring in some cases of chronic Bright's disease; also the tinnitus occurring occasionally without evidence of tympanic disease in the course of acute infectious diseases.

The most characteristic cases of neurotic tinnitus, however, are found in patients suffering from neurasthenia or nervous exhaustion. In the diagnosis of these cases the process of exclusion naturally forms an important part. Thus, on examination of the patient, there may be found no disorder of the general circulation, no evidences of disturbed labyrinthine pressure, no visceral disorders which might affect the ear reflexly. Examination of the ear may reveal nothing abnormal within the meatus or tympanum, or, as is more common, a tympanic lesion being present, its correction does not result in relief of the tinnitus. Such negative results should suggest at least the possibility of a functional nervous disorder.

Careful questioning next brings out the fact that the noise is made worse by bodily or mental fatigue; thus, it may be absent or hardly noticeable in the morning, after a night's rest, but reappears or becomes distressing as the day advances.

Cerebral sounds are those due to irritation of the auditory nerve centers in the cerebral cortex.

Most authorities agree that complex or elaborated sounds, *i. e.*, sounds taking the form of voices, tunes, distinct words or sentences, are to be regarded as of cerebral origin.

This form of tinnitus belongs to the neurologist rather than to the otologist.

Before undertaking to treat tinnitus aurium, a careful consideration of the causes is important. Kerrison mentions the following source from which we may draw our information:

1. Evidence of disease in any portion of the conducting apparatus as shown by physical examination.
2. History of the case, and character of the sound, as described by the patient.
3. Results elicited by careful functional examination.
4. Evidence of disease in other parts of the body, particularly as to the presence of digestive disorders, circulatory disturbances, blood dyscrasias or disease of the nervous system.
5. Effect of certain drugs, either in relieving or aggravating the tinnitus.

The importance of careful physical examination of the ear becomes evident from the fact that any appreciable lesion in any portion of the conducting apparatus must act at least as a contributing cause in the production of tinnitus, whatever the character of the sound and whatever the chief factor in its causation may be.

The importance of the pitch depends upon the fact that, generally speaking, low sounds suggest tympanic and high sounds labyrinthine involvement. The pitch is best determined by holding a vibrating tuning-fork of 256 D. V. opposite the patient's ear and requiring him to decide whether the subjective noise is higher or lower in the musical scale, according to which it may be classed as a high or low sound. Further than this, the determination of the exact pitch has not been demonstrated to be of any practical value. It is also important to learn whether the noise varies in intensity, at what hour it is most noticeable, how it is influenced by physical exercise, rest, ingestion of a full meal, etc.

The length of time during which the tinnitus has been present is also of some importance, since tinnitus of purely tympanic origin rarely persists very long; while a subjective noise persisting from childhood to adult life might suggest the possibility of anomalies in the course or position of vessels.

Of still greater diagnostic value are the reactions to functional tests. Thus elevation of the lower tone limit suggests tympanic disease; whereas lowering of the upper tone limit points to labyrinthine disturbances. Bone conduction is also of diagnostic value, increase pointing to tympanic, and diminution to labyrinthine disorder.

With tinnitus confined to one ear, Weber's test, if lateralized to the same side, would suggest tympanic trouble; whereas if lateralized to the opposite side, the inference would be of labyrinthine disturbance. In other words, the same tests which would aid in locating the cause of an impairment of hearing may be used in our search for the lesion upon which tinnitus depends.

But while the physical and functional examination of the ear may give clear enough indications in tinnitus of purely aural origin, there are also many cases in which they are of service only in their negative results, which direct the attention away from the ear in the search for the underlying cause. In such cases the most thorough physical examination and most searching inquiry into the patient's general condition may be necessary—all the organs of the body being looked to for evidences of disease, and each slightest symptom being weighed as a possible factor in producing the patient's trouble.

Obviously, no single plan of treatment will ever be found applicable to all the different forms of tinnitus: and the results of treatment must always be proportionate to the thoroughness of the search for the underlying cause.

C. G. Lewis[1] finds that the imagination and descriptive powers of patients vary in regard to the *character of their tinnitus.*

They often employ terms of comparison suggested by their peculiar surroundings or occupations and liken the tinnitus to the noises they are most accustomed to hear; thus, to the railroad man it may simulate the ringing of bells, the tooting of whistles or the escape of steam; to the farmer, the warbling of birds, the rushing of water, the chirping of the cricket, or the rustling of the leaves in the forest; and to the housewife, the boiling of water, the

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(1) Phil. Med. Jour., June 28, 1902.

frying of food, etc. There is hardly a sound familiar to the daily walks of life that has not been likened to some form of tinnitus. Most patients complain of a noise similar to that heard when holding a shell to the ear. Many have a tinkling or ringing, some have a hammering or pounding, some a cracking or snapping, some a whistling or hissing and occasionally, though rarely, those of a pleasant nature are experienced, such as the sound of distant music, of familiar voices, etc.

Children suffer less from tinnitus than adults on account of the more yielding condition of the membranes of the middle ear, but when they are affected with it they seldom complain of unpleasantness.

In a series of 137 cases of tinnitus treated by T. J. Harris[1] he used, in addition to local measures, therapeutic agents in the following order of frequency: Strychnia, iodid of potash, nitroglycerin, tinc. gelsemium, bromid of potash, tinc. digitalis.

Strychnin sulphate in one-sixtieth grain doses before meals gave the best results, which are not brilliant. In every case the question of sound wave interference had been previously eliminated. Strychnin was used in 17 cases; relief greater or less and in some instances only temporary, was obtained in 7, or 41 per cent.

Iodid of potash was prescribed in three cases of chronic diseases of the internal ear, with relief in all, and two cases of acute trouble with equal success, while in eight cases of mixed disease there was relief in only two, or 25 per cent.

Nitroglycerin was given in several cases with high tension of arterioles. It was often necessary to give large doses, sometimes as high as 20 minims in the day, in order to produce decided physiologic results. In at least two cases the effect on the tinnitus was flattering, but naturally the large dose could not be continued. With digitalis, on the other hand, tried where there was a clear nervous or arterial tinnitus, the results were uniformly disappointing. In every instance the drug deranged the stomach without influencing the noise.

Tincture of gelsemium was employed in a number of cases, at times with good results. The results certainly

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(1) Laryngoscope, March, 1902.

warrant making use of it, where strychnin has failed. The drug is a spinal depressant and has no decided action on the heart.

In ten cases where it was given there was relief of more or less permanence of five. All of these improved cases were cases of middle ear disease. The drug failed totally in cases of internal disease.

**Hysteria.** Voss[1] reports twenty-four cases of ear disease in hysterical subjects. In some the ear disease was only simulated, while in others the symptoms of a real disease were greatly exaggerated. He makes a number of excellent suggestions as to diagnosis, etc. When it is necessary to operate upon a patient who is predisposed to hysteria, he thinks that it is important not to describe the operation as dangerous to life, or even dangerous at all, but to make the prognosis favorable, in order not to burden the patient's mind any more than necessary.

He condemns the usual method of after-treatment of operations, *i. e.*, the custom of tamponing the wound. The long duration of these painful or at least sensitive manipulations makes them a source of torture for nervous people, and especially for nervous children.

He reports the following cases: 1, A young lady with severe hysteria. The ear could hardly be examined, for she drew her head away, claiming the speculum caused unbearable noises. Sensation of the skin was normal. Tuning-forks, vibrating so feebly as to be hardly perceptible to the normal ear were unbearably painful to her. Weber's test with forks C, C′, and C″′ produced the same result, while C″ was not heard at all, no matter how hard it was struck. Hearing of voice and watch above normal.

This appeared at first like a pure case of acoustic hyperesthesia, until examination with various forks revealed the tone-defect. In cutaneous hyperesthesia the pains are frequently exaggerated to such a degree that the diagnosis is quite plain. The slightest touch or the mere proximity of the finger to the ear causes the patient to draw away, although sometimes we may be able, when the attention is taken up with something else, to press hard without causing pain. To the sensitiveness to touch there may be added spontaneous pain, or the latter may exist by itself and then

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(1) Archives of Otology, August, 1902.

we have otalgia or mastalgia. In these cases a wrong diagnosis may be of serious consequence in causing unnecessary surgical procedures.

2. A very young nurse had charge of a severe mastoid case that died of sinus thrombosis, and, soon afterward, that of another small ear patient. A week later she complained of intense earache, though the parts appeared normal. Reassurance did not improve her condition, but a dose of bromids and valerian did so very quickly.

3. A young lady in stooping accidentally ran one branch of her spectacles into her right ear. She immediately became very deaf, not only in the right but also in the left ear. She had loud noises and a giddy feeling in the head. Examination the same day showed a small injury to the roof of the meatus, but the membrane was intact and anesthetic. The deafness of the left ear soon vanished, but that of the right ear persisted a long time. It is probable that the continued treatment contributed to her condition. She was sent to a nerve specialist, but did not go. That the first diagnosis of a neurosis was correct was proved a year later, when she came again completely deaf in both ears and with the "same terrible noises" in the right ear. In a narrow street she had passed close to a pair of horses and one of them snapped at her. This time she was persuaded that the trouble was merely due to fright and demanded no further treatment. The deafness gradually disappeared.

The following case is given as reported by Dr. Voss: "A nine-year-old boy suffered for three or four days from very severe pains in his left ear, so that he wailed night and day in spite of narcotics. There was no fever, the mastoid was tender, not swollen and its skin unchanged. The drum membrane was shining, darker gray than on the other side, not injected, not bulging. Hearing diminished.

"I was struck by the active assiduity with which the boy, who had just been moaning in bed, left the same and sat down to be examined. He was an only child with hereditary taint. The father died in an insane asylum and the mother—well, she will appear sufficiently in this history. The patient was taken into the hospital, where for three days the pain and the appearance of the membrane continued the same. Believing that I was dealing with a serous otitis, I performed a paracentesis, but to my surprise found no exudate. The cut healed in twenty-four hours, but there was no change in the condition. An ice-bag was applied, followed by improvement, and then suddenly relapse was due to the following: the mother had been well pleased with the ice-bag because it drew out so large an amount of matter from the ear. When the nurse laughingly said that this was only ice water, the dissatisfaction and aggravation immediately appeared, especially when the nurse or physician entered the room. While listening at the closed door one could hear mother and son quietly conversing, even laughing. A nerve specialist was called who diagnosed hysteria and ordered the boy to leave the bed and exercise; and now the music began. We were called rough and heartless in the presence of the boy, who asserted he could not walk and always fell to one side, invariably finding, however, a ready support on the cross-bar of a window without touching the glass. The assurance that the boy could be cured, but only if the mother went off on a trip, was answered by the coarsest invectives, directed against us."

From his study of the series of cases, he concluded that:

1. The objective picture of an acute otitis media may appear as a symptom of hysteria.
2. Pure functional neuroses of the ear should be treated, not by an otologist, but by a neurologist.
3. In these cases an absolute contra-indication exists against too much treatment, especially of the nose and pharynx.
4. The generally well known craving of hysterical subjects for operations may also center upon the ear (and probably also upon the nose).
5. Opening the mastoid process to relieve the mastalgia of hysterical patients is absolutely contra-indicated.
6. Our present method of after-treatment of radical operations with prolonged tamponing is not at all suitable for children or nervous and hysterical patients. After the fifth day the tampon is entirely superfluous and should be replaced by a simple outer dressing.

**Functional and Hearing Tests.** In a recently published article[1] the Editor has considered this subject. Errors in

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(1) Laryngoscope, April, 1902.

making functional examinations of the ear usually arise from: 1. Faulty constructed or poorly adapted instruments. 2. Failure on the part of the examiner to understand his instruments, or to use them properly. 3. Failure on the part of the patient to promptly and accurately respond to the various tests.

The tuning-fork stands first as an instrument for making functional examinations. There is a great variety of tuning-forks on the market, each possessing some good qualities and most of them more or less serious defects. Tuning-forks may be divided into two general classes, those with weights and those without weights. The weighted forks have the advantage of being free from overtones, but are useless for testing bone conduction, because of the jar transmitted through the handle, the sensation of which the patient is liable to mistake for sound. The chief defect in unweighted forks, especially those below $C^3$, 1024 vibrations per second, is the presence of overtones. Overtones are produced by short vibrations of the prong upon itself, while it is passing through its long vibration in unison with its fellow. A good test for overtones in a fork is to strike about the middle of the prong with some light, hard object, as a pencil. The metallic ring is the overtone, and is one or more octaves above the true tone of the fork. In some forks two or more distinct overtones can be detected. In selecting a fork one should be chosen which has the least metallic ring when struck with a pencil.

Before undertaking to make functional tests it is necessary to determine how long the normal ear can hear the fork used. The amount of impairment in any given ear may be expressed by a fraction the denominator of which represents the time a normal ear hears the fork, while the numerator shows the time the impaired ear hears it. Many of the published records of functional tests are of no value because the writer has failed to ascertain or neglects to state the time which the fork he used can be heard by the normal ear.

In comparing air conduction with bone conduction, it is generally understood that in the normal ear the fork should be heard when the handle is against the mastoid one-half as long as when the prongs are held opposite the meatus.

In testing bone conduction it makes a decided difference upon what part of the mastoid the handle of the fork is placed, and also, whether the handle is allowed to touch the back of the auricle. In a series of cases recently tested in which there was no history of past or indications of present ear disease, three points of contact for the handle of the fork were selected as follows: 1. The tip of the mastoid. 2. A point behind the meatus corresponding approximately to the mastoid antrum. 3. A point immediately behind the meatus, but in close contact with the back of the auricle. The average time which a given fork was heard on the tip of the mastoid was 25 seconds. Over the antrum 30 seconds, while in contact with the back of the auricle the same fork could be heard fully 40 seconds. Probably the best position for the handle of the fork is directly over the mastoid antrum. The amount of pressure exerted upon the handle of the fork also makes a difference. In the series of tests already mentioned it was found that the fork could be heard 5 to 8 seconds longer when deep pressure was made than when the handle was pressed lightly against the mastoid.

In testing air conduction, it is a good plan to cover the patient's eyes and compel him to depend entirely upon his ears. When the patient can see that the fork is near his ear he is liable to imagine he hears it when the examiner knows that the fork is not vibrating. Sometimes the tinnitus so closely resembles the sound of the fork that the patient is unable to tell when he has ceased to hear the vibrations. In such cases a fork of higher or lower pitch should be substituted. Repeated tests should be made for the sake of accuracy. In using the low forks the patient will sometimes insist that he hears the fork when he only feels the vibrations of air set in motion by the movements of the fork. Holding the open end of the fork toward the ear will obviate this difficulty.

The *new Galton whistle* as constructed by Edelmann is described by H. MacNaughton Jones.(1) He thinks it is important to determine the upper tone limit by means of this instrument, since the upper tone limit has a decided bearing on both the diagnosis and prognosis in each case.

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(1) Edinburgh Med. Journal, April, 1902.

D. T. Vail[1] has devised a *hearing chart* for recording the upper and lower tone limits. It is built upon the musical scale, having the base and treble clefs in their proper position in the normal range of hearing. There are about eleven octaves extending from the lowest perceivable tone, 16 vibrations per second, to the highest, about 50,000 per second.

*Hot Air in Ear Diseases.* The use of superheated air in ear diseases has received considerable attention during the past year. Favorable reports are made from time to time upon its use, both in the external auditory canal and in the Eustachian tube and middle ear. That it is of value in many cases cannot be questioned but the action of certain physical laws regarding the cooling upon expansion of hot compressed air makes difficult its application through the Eustachian catheter. The best apparatus for this purpose is without doubt that devised by W. K. Seelye, described by J. F. Oaks.[2] This apparatus consists essentially of a brass tube around which is closely woven a coil of wire of high resistance. Outside of this coil is a packing of asbestos, all of which is encased in a nickel-plated brass tube three-fourths of an inch in diameter and about two inches in length. The distal end is in the form of a metal tip of the size and form of the ordinary "cut-off" tip. The proximal end is made of black fiber so shaped as to be held easily with two fingers while the thumb rests against the cut-off, making the whole length of this very handy apparatus 3½ inches.

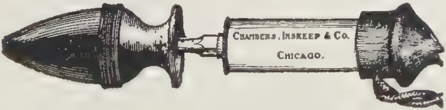

Fig. 26.

The wire used is of a kind which offers high resistance, generating heat, causing the inner brass tube to become sufficiently hot to heat the compressed air in its passage

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(1) Laryngoscope, May, 1902.
(2) Laryngoscope, September, 1902.

through it. All the metal parts are of brass and all joints are either spun together or screwed, there being no soldering. See Figs. 26-28.

The conducting cords are attached by a screw plug to the lamp socket. In the cord is introduced a single point button switch which is placed on the table within easy reach of the operator.

To operate the "Heater" the circuit is closed by pressing the button of switch for four or five seconds. The heater will then deliver air under ordinary pressure at the desired degree of heat for catheterization of the Eustachian tube, and will retain the heat long enough to complete the treatment of one patient.

D. P. MacMillan[1] describes the *"audiometer,"* an instrument for testing the hearing acuity of school children. The apparatus consists of an induction coil, a battery, a galvanometer, a resistance coil, switches, and a telephone receiver, all done up in a convenient and portable handbox. By turning a switch the dry battery can be thrown into the primary circuit of the induction coil. Another switch turns the galvanometer into the circuit. Then by varying the resistance by means of plugs the fall of potential over the primary coil can be made constant as indi-

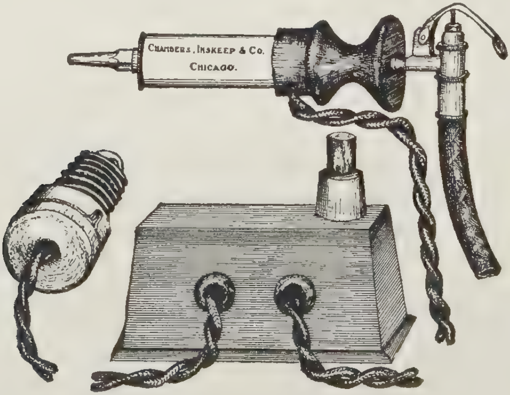

Fig. 27.

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[1] Medicine, April, 1902.

cated by the galvanometer. The primary circuit can be opened and closed rapidly by means of a key, and as no stimulus can be produced save when the current is closed,

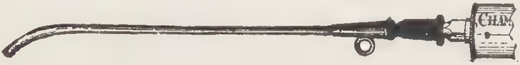

Fig. 28.

the making and breaking of the current makes sharp clicks, which serve as a stimulus whose intensity can be varied at will by means of a secondary coil.

In testing 6,729 Chicago school children, ranging in age from six to eighteen, 16 per cent were found to be defective in one or both ears. The largest percentage of defective ears was found in children about eight years of age. Nearly 10 per cent of all the children examined were defective in only one ear. Attention is called to the importance of seating such children so that the best ear will be next to the teacher.

# THE NOSE AND THROAT.

# INTRODUCTORY NOTE.

Another year has gone and the progress in laryngology is to be summed up. The increasing knowledge of the specialty is apparent to everyone, the small towns as well as the larger cities are to-day supplied with competent laryngologists. A certain proportion of the brotherhood is content to use the work already done and to be satisfied with it, a second number supply much to medical journals without adding materially to the sum total of laryngologic knowledge, the elect few work ceaselessly and the result of a portion of their labors is recorded in the pages of the Year Book.

Perhaps the most interesting work in our specialty is being done in diseases of the accessory sinuses, and while America has been doing some good work we must acknowledge that that of men like Killian and Jansen is in another class. It must be remembered, however, that although we learn much from radical work, attention must also be given to the fact that there are conservative methods of treatment which must not be disregarded, and that however valuable a perfectly dry frontal sinus may be to one who has had nothing but pus and pain from it for years, a depressed scar and double vision are by no means desirable. Bronchoscopy with the possibility of sufficient expertness to make the removal of foreign bodies possible has been exactly described, but the man who contemplates doing this usefully must get himself a manikin and devote many hours to practice. Our duty is done if the way is pointed out. Freer's septal operation should enlighten many who are not familiar with anything but the easily performed but not always successful procedure of Asch. Gersuny's use of hard paraffin has done more to make some of our patients happy than one could have expected from his use of the fluid varieties of the product. The tonsils, faucial and pharyngeal, tuberculosis and syphilis, nasal reflexes and the recurrent laryngeal nerve are pretty much where they were last year, but we shall doubtless find enough in the daily round and common task to keep us busy.

T. M. H.

# THE NOSE AND THROAT.

## THE NOSE.

**Anatomy.** The findings in 50 anatomic sections of the nose and its accessory cavities with reference to the bones of the face have been reported in detail by Minder.[1] Craniometric measurements show that small nasal openings correspond to a narrow upper part of the face and vice versa. Microscopically, in 14 autopsies the findings were normal, in 10 inflammatory changes, in 12 transitional epithelium, in 14 metaplasia of the turbinate mucosa, the latter being of equal frequency in narrow and wide faced individuals. Of the former in 10.5 per cent, of the latter in 8.3 per cent swelling and metaplasia of the turbinates were found.

In an examination of 11,000 skulls E. S. Talbot[2] found that owing to the fragility of the septum the whole of it or its anterior part was lost in many. But 7,600, therefore, had sufficient remaining to give an idea of its shape; 5,762 of this number showed marked deformities. A careful study of these deformities showed that the septum could be divided into three parts, anterior, middle and posterior. While traumatism occasionally may produce deflection in the anterior third of the nose, how it could produce deflection merely in the middle or posterior third of the septum is not easily demonstrable. The theory that from 50 to 80 per cent, or even 5 per cent of the deformities of the septum are due to such injuries is demonstrably illogical. In the large number the author examined, 2,684 possessed what appeared to be fracture. The theory that deformity is "primarily" the result of traumatism due to injury *in utero* or at the time of delivery, or even subsequently, except by direct force and secondarily to a slow inflammatory process, will not account for these de-

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(1) Archiv für Laryngol. u. Rhinologie, 1902, B. 12.
(2) The Laryngoscope, March, 1902.

formities. A theory much in favor is that of Trendelenburg—that these deformities are "due to a crowding up of a high-arched palate. An arched palate" is never seen with the first set of teeth. Deformed palates never begin to develop until the sixth year and development is always completed by the twelfth. Deflected septa are often observed before the sixth year. Deformed septa are found in the early races who never have contracted high vaults. The author brings an array of evidence from normal vaults and jaws to disprove the theory that high vaults and contracted arches are a cause. In neurotics and degenerates when arrest of development of the face and nose has taken place, the width measured .50 to .60 of an inch and the length .80 to .90 of an inch. In these cases, if the turbinated bone develops uniformly, the vomer will be straight. If asymmetry exist, the vomer will be deflected to one side or the other, in which case the bone, when covered with mucous membrane, will fill the cavity of the nose and mouth-breathing will result. When arrest of development of the face occurs, there is always arrested development of the upper jaw and of the bones of the nose. Deflection of the septum depends upon the walls of the nose and the turbinates. The walls of the nose and the turbinates ossify before the septum, hence the septum must adapt itself to the location of these bones. Excessive development of the turbinated bones is very common. Mouth-breathing is due to arrested development of the nasal cavities and bones, excessive development of the turbinates and mucous membrane. This, together with adenoids, is the result of an unstable nervous system. That the patient may breathe through the mouth the lower jaw drops slightly. This causes the alveolar process to elongate, carrying the teeth with it; hence, the high vault. Given an undeveloped jaw, the teeth arrange themselves as best they can, the character of the deformities depending upon the order of development of the teeth.

**Physiology.** A. Courtade[1] describes an instrument for the graphic *measurement of the volume of the nasal fossæ*. The pneumodographe, as it is called, consists of three glass plates; one, vertical, placed near the mouth; another, horizontal, placed some distance from the nares;

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(1) Annales des Maladies de l'Oreille, etc., 1902, XXVIII.

the third, vertical, placed antero-posteriorly to divide the two preceding plates into two equal parts and separating the air expired by the two nostrils. The expired air is deposited on the cold glass plates and the amounts estimated.

Ballenger[1] makes a statement explanatory physiologically of some of the symptoms of *mouth breathing.* The respiratory functions of the nose are to warm (or cool), moisten and filter the inspired air. In mouth-breathers this function is absent or impaired. The lower air tract is incapable of supplying the requisite amount of moisture; hence the air vesicles and bronchi are abnormally dry. This irritation causes certain pathologic changes in the air vesicles which impairs their capacity to absorb oxygen and throw off carbon dioxid. Deficient oxygenation of the blood results in the toxic products being thrown off into the circulation. The half-way products are toxic and cause nervous phenomena and malnutrition. The malnutrition leads to physical imperfection or malformation. Excessive accumulation of carbon dioxid in the blood impairs the function of the leucocytes and other cellular structures. The products of faulty metabolism (half-way products) are not removed from the circulation by the crippled leucocytes. The nervous phenomena are thereby still further increased by their presence.

**Technic. Sublabial Rhinotomy.** In the opinion of Galand[2] only median rhinotomy and the operation of Ollier can be at all compared with sublabial rhinotomy. It has the following indisputable advantages: It is simple of execution; it does not involve the nasal skeleton; it affords plenty of light; it leaves no visible scar. As a preliminary operation sublabial rhinotomy is the best.

## External Deformities.

**Paraffin Injections.** This method, first suggested by Gersuny has been widely used during the past year. Applicable to a variety of cases it becomes, in the hands of a surgeon having ideas as to cosmetics, a powerful adjunct to his knife in plastic operations. For the cor-

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(1) Annals of Otology, etc., August, 1902.
(2) Annales des Maladies de l'Oreille, etc., September, 1902.

rection of external deformities of the nose it is, of course, the method of choice because beyond a temporary edema due to compression of the lymph vessels and an occasional persistent redness of the skin, it presents no objections. As to its use in atrophic rhinitis with ozena there is a difference of opinion, occasional phlebitis of the facial vein having occurred. The disease is, however, so objectionable that we are warranted in taking certain risks if a cure can be accomplished, and in the Editor's opinion further experiments with the method should be carried out. Among the papers on the subject may be mentioned those of Broeckaert,[1] Brindel,[2] and Quinlan.[3] In treating ozena the former prefers paraffin with a melting point of 50 degrees C. and the temperature of the mass should be 60 degrees C. He incorporates an antiseptic with the paraffin, his choice being guaiaforme, a combination of formaldehyde with guaiacol. It is a yellow powder, insoluble in water, soluble in dilute alkaline solutions. In the tissues it decomposes into guaiacol and nascent formaldehyde. According to Brindel (loc. cit.) the patient suffering from atrophic ozenous rhinitis can expel the crusts more easily, their formation is lessened and the secretion from the nose becomes watery. He reports two cases of phlebitis of the facial vein. In one a single injection was followed by the accident; in the other the injections were made on both sides, but the complication occurred on one side only. Eckstein[4] carefully describes the method adopted in J. Wolff's clinic in Berlin. They use the so-called hard paraffin which has a melting point of 57 to 60 degrees. To overcome its tendency to harden Eckstein covers the syringe and canula with rubber tubing, which not merely retains the heat in the syringe, but also enables the operator to handle the heated instrument. The filtered and sterilized hard paraffin is heated in a water bath until its temperature is from 65 to 70 degrees C. and drawn into the syringe, which has first been warmed with several syringefuls of sterilized hot water. To prevent the paraffin hardening in the needle a couple of drops are expressed and replaced by hot water. The bent needle

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(1) Revue hebdomadaire de Laryngol., etc., July 5, 1902.
(2) Ibid, June 2, 1902.
(3) Laryngoscope, August, 1902.
(4) Deutsche medicinische Wochenschrift, August 7, 1902

point of the canula is introduced as far as possible from the prospective site of the injection. Around this location the assistant is to exert firm pressure and the injection is to be done gently and evenly. When the desired amount has been injected one waits 20 seconds for the paraffin to harden before withdrawing the syringe. A moist dressing should be applied at the site of introduction of the needle for two days.

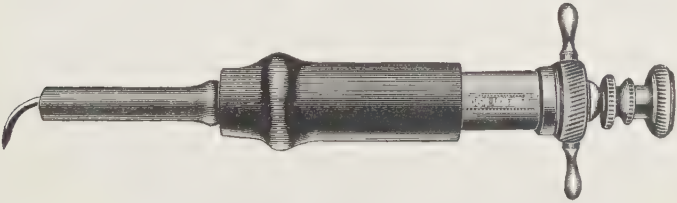

Fig. 29. Eckstein's Syringe.

Quinlan uses an ordinary glass antitoxin syringe with a needle of large caliber. This is encased in a metallic hood or jacket through which flows water at a temperature of from 118 to 125 degrees F. This hood is fed from a receptacle holding not less than one to two quarts of water of the temperature named, placed one or two feet above the operator and connected with the hood by a small rubber tube.

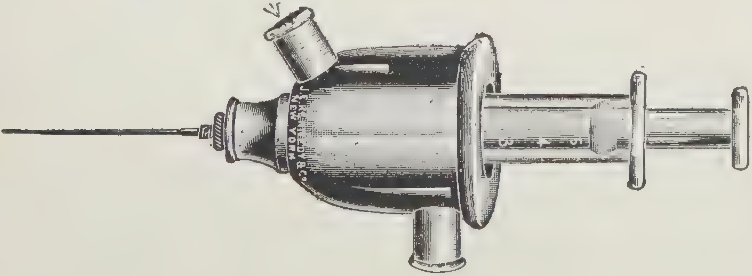

Fig. 30. Quinlan's Syringe.

Parker[1] uses a mixture of ordinary lump paraffin and white vaselin which has a melting point of 102 degrees F. To prevent the paraffin from hardening in the

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(1) Journal American Medical Association, April 9, 1902.

syringe the latter was placed in hot water until needed. Before inserting the needle the syringe was tested and if the needle had become clogged the obstruction was removed by a strand of fine wire. The paraffin was allowed to cool off sufficiently to flow from the needle, not as a liquid, but as a worm-like, semi-solid coherent string.

**Nasal Bones.—Displacements.** Goodale[1] describes a method employed for the correction of *old lateral displacements of the nasal bones* in 22 cases. The technic is based essentially on the procedure described by the author in 1898, for the correction of the convex deformity of the nasal bridge. In both operations one seeks to obtain mobilization of the nasal bones *en masse,* with the object, as in the case of Roman nose, of depressing them, and in the case of lateral displacement of restoring them to a median position. In the case of lateral deformity it is effected in the following manner: The patient is etherized and placed in a sitting posture. After application of a solution of suprarenal extract to the roof of the nose, a pair of short-bladed scissors is introduced into the left nasal vestibule. One blade is made to penetrate the triangular cartilage at its anterior extremity immediately beneath the skin and a cut is made through the septum, parallel to the external outline of the bridge of the nose, 1 cm. below it, terminating at the junction of the perpendicular plate of the ethmoid with the cribriform plate.

The next step consists in freeing the nasal bones from their lateral attachments to the nasal processes of the maxillary bone. A small, strong nasal saw is introduced, with its teeth uppermost, into one nasal passage, and the articulation of the nasal and maxillary bones sawn through from below upwards,—nearly, but not quite, through—the fingers of one hand being placed on the skin over the articulation, to feel when the first saw teeth make their appearance through the bone. It is found advantageous to stop the saw-cut before the articulation is completely divided, leaving the bones somewhat loosely joined by a few spicules, which serve later as splints to retain the bones in the desired position. The saw-cut is next repeated on the opposite side through the corresponding articulation. By the foregoing procedure, the nasal

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(1) Boston Medical and Surgical Journal, Nov. 14, 1901.

bones are freed from their articulations, with the exception of their attachment to the frontal bone. One or two careful blows with a mallet on the convex side of the displacement usually suffice to loosen the fronto-nasal articulation, rendering it possible to carry the nasal bones into the median line. The upper strip of septum, attached to the roof of the nose, slides at the same time laterally a short distance upon the lower part, attached to the floor of the nose. As there is generally a slight lowering of the nasal bones *en masse* by their replacement, the upper strip of septum overlaps the lower portion to a corresponding degree, and is thereby to a certain extent retained in position. In uncomplicated cases of lateral displacements the operation is now completed. It often happens, however, that a considerable depression of one nasal bone was caused by the original injury. In young persons, where the articulations are not too rigid, it is possible to elevate the depressed bone by a short, stout, blunt pair of scissors, introduced into the nose and pressed forcibly upwards. It is occasionally, however, necessary to separate the depressed nasal bone from its fellow by an extra saw-cut before it can be elevated.

An external splint is always necessary.

Clark[1] reports two cases operated on for *deformity of the nose.* In the first case the mucous membrane was cut through with a small bistoury close to the septum and below the deformity and by means of a blunt dissector, introduced through this opening, the skin was freed over the prominent portion of the nose. Then a pair of slightly curved scissors were introduced and the redundant cartilage removed piecemeal until the shape of the nose seemed about as it should be. Dressing of cardboard and adhesive plaster. The second case shows some of the difficulties which one may encounter in attempting to correct old displacements or fractures of the nasal bones. The points to be emphasized in this case are: The extreme thickness of the right nasal bone, the failure of the nasal bones to separate from the frontal at the suture, and the inability, owing to the condition of the skin, to keep on support as long as it seemed advisable.

**Fistula.** N. H. Pierce[2] reports a *fistula* which resulted

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(1) Boston Medical and Surgical Journal, March 6, 1902.
(2) Archives of Otology, Rhinology and Laryngology, May, 1902.

from a congenital dermoid, rare, so far as the bridge of the nose is concerned. Electrolysis to destroy lining membrane of fistula was objected to on account of the pain. Operation: The fistula was laid open and found to be lined with smooth shining mucous membrane. A blind branch dipped down beneath the left nasal bone. Dissection of the tissue, the use of the sharp spoon and suture of the wound resulted in cure.

Fritz Koenig[1] cites a case where a *defect in the nasal ala* was overcome by grafting a flap from the upper portion of the auricle, both helix and its fossa, at the site of the defect. The tissue of the flap being histologically analogous to the tissue of the nasal ala and containing abundant blood vessels, the result was good. The advantage of this method consists, moreover, in the facts that the defect in the ear is easily covered up with hair, and in case of necrosis of the flap the other ear can be used and the cicatrix around the flap is almost *nil*.

## NASAL SEPTUM.

**Deflections.** *Asymmetry of the nasal cavities* is discussed by Coolidge[2] who says that the causes of asymmetry of the nasal cavities come under one of three heads: 1. When deviation of the septum is primary and the accompanying changes in the turbinates are due either to changes brought about by the inspired air current, or to pressure on the turbinate. 2. When deviation of the septum is secondary, caused by a primary change in the shape of the turbinated. 3. When both the deflected septum and the asymmetrical turbinates and outer wall are due to a common asymmetrical development. Delavan states that conditions favorable to hypertrophy of the turbinated bone would seem to be (1) unusual space in the nasal fossæ; (2) long-continued hyperemia of the structures investing the bone; (3) the existence of the above conditions during the period of greatest constructive activity. Lennox Browne considers hypertrophy of the turbinate on the concave side as compensatory. A turbinated body should be judged by the distance between it and the septum, and not by its absolute size. In cases of deviation of the septum the common asymmetries of the other intranasal structures should be classed as physiologic compensatory changes. As a rule, these changes in the turbinated bodies and ethmoid bone are due to increase or diminution of the air current. Neither is the deflection of the septum often secondary to asymmetrical turbinates. Whatever may be the mechanism which underlies this adjustment, the ethmoid and the turbinated bones are especially endowed with nutritive adaptability, and in consequence are able to minimize the disturbance which a deflected septum would produce. Slight deflections are often rendered entirely innocuous, more extensive ones partially so. The entrance into the nasal cavities proper cannot share in this readjustment and here a deflection of the cartilage of the septum soon becomes obstructive.

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(1) Berl. klinische Wochenschrift, February 17, 1902.
(2) American Journal Medical Sciences, November, 1901.

The *etiologic factors* in the production of deflected and deformed nasal septa are discussed by Nelson Black.[1] In cases of deflected septum the bony structure has become weakened primarily by traumatism, the strumous or rachitic diathesis, adenoids, the acute infectious diseases of childhood, or, in fact, anything which would tend to lessen the resisting power of the bony septum. The palatal portion of the superior maxilla tends to become more V-shaped as the resistance of the septum is less on account of its weakened condition, and with the increased arching of the palate the already weakened septum "buckles" more and more, the cartilaginous portion yielding most. Further, etiologic features which tend to produce irregularities of the superior maxilla are causative factors also in septal deformities. In all of these cases the services of the orthodontist must be secured before treatment of the nasal condition can be satisfactory.

**Operations.** O. T. Freer[1] contributes a clearly written article, illustrated, descriptive of the operation preferred by him in deflections of the nasal septum, and contrasts it with the operation suggested by Asch, which he considers to "represent a departure from the more skillful procedures of rhinology and a return to those of the general surgeon not having special practice in visual operations within the nasal cavity." A description of a typical

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(1) American Medicine, February 15, 1902.

operation follows: "Taking, for example, an angular deflection far forward, an incision is made down the crest of the angle and forward at its base so as to outline a triangular flap of mucosa. This incision is made with a small knife whose blade is bent on the flat on the shank at an obtuse angle. The blade is one-half of an inch long and three-sixteenths of an inch wide. The triangular flap of mucosa thus outlined is pushed away from the cartilage in the usual manner with Ingals' nasal spud. The exposed triangle of cartilage is cut around at its

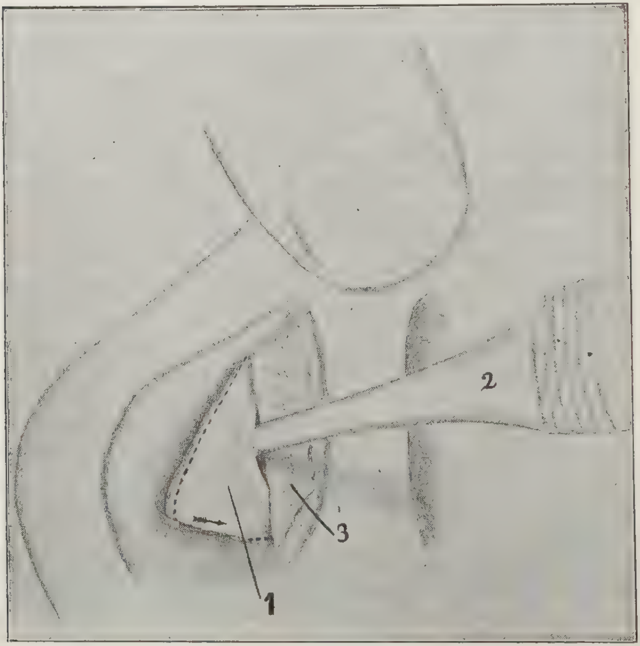

Fig. 31. Right nostril showing angular deflection with mucous flap reflected forward. The triangle of cartilage has been outlined with the cartilage knife, and is being raised at its anterior border with Ingals' spud, which is lifting off the mucous membrane in the opposite nostril. The dotted line indicates cut through cartilage. The arrow shows direction of cut along base of triangle underneath bottom of deflection and therefore for the most part invisible. 1. Triangle of cartilage. 2. Ingals' spud. 3. Reflected flap of mucosa. (Jour. Am. Med. Assoc.)

borders with the small Ingals cartilage knife designed to cut merely through the cartilage without injuring the mucosa of the opposite side. The triangle of cartilage, after separation at its margins, is freed from the mucous membrane of the neighboring nostril with a spud. This is accomplished by passing the spud through the incision in the cartilage at the anterior border of the isolated triangle of cartilage, which is seized with rat-tooth forceps and finally removed. When the angular deflection extends far up towards the nasal roof it is often difficult to sever the attachment of the triangle at its uppermost part. To meet this difficulty and for continuance of the operation further back after the triangle has been removed I have designed two modifications of Ingals' cartilage knife, a right and a left hand knife, for cutting up or down. In these knives the plane of the flat surface of the little blade is at right angles to its slender shank and may therefore be used far back or high up in the nasal cavity. Its blade is only one-eighth of an inch long and if the cartilage be thicker than this it may be made to sever it by pressing the knife into its substance while making repeated cuts. In all but very rare cases it will sever the cartilage at the first incision. I have never made perforations with these knives and do not find it necessary to keep the finger in the opposite naris to feel if the blade be cutting through as Boenninghaus recommends for his incisions, but find this proceeding of value to support the septal cartilage so that the knife can enter it.

"Up to the removal of the triangle of cartilage the operation has been a typical Ingals one. Its continuance, as far as the cartilage is concerned, is practically the method of Krieg. The removal of the triangle of cartilage leaves exposed to view the inner surface of the mucosa of the opposite side of the septum. At the posterior border of this raw area the cut edge of the septal cartilage presents as a snow-white vertical narrow surface. The spud or a slender spatula is inserted between the outer edge of this surface and the mucosa of the convex side which is separated from the cartilage as far back as it can be reached. While the cutis-like mucous membrane of the anterior one-quarter of the cartilaginous septum is difficult to undermine with the spud and has to be dissected away from its attachment, the mucosa of the parts of the septum back of this may be peeled from the underlying bone or cartilage with perfect ease. It is thin and delicate and not easy to see. The mucous membrane of the opposite or concave side of the deflection is next separated in a similar way, great care being taken not to perforate it. When this step is completed the cartilage or cartilage and bone of the posterior limb of the angle of deflection is bare of mucous membrane on both sides as far back as can be reached and if it be moderate in length, in its entirety. The next step is removal of the bared cartilage. For this purpose the little cartilage knives with right-angled attachment of blades mentioned are used. According as the right or left nostril is the field of operation one or the other is introduced between the mucosa of the opposite naris and the septal cartilage and pushed back as far as the mucous membrane has been separated from its base. The point is then turned outward and made to pierce the cartilage. Next the blade is swept around the base of the cartilaginous flap to be removed, cutting it through. Usually the cartilage knife will catch the loose piece like a hook and bring it away. If this does not occur the fragment may be twisted off from its remaining adherence with forceps. Another white narrow surface, the edge of the cut cartilage, will now be in view and if the deflection be not entirely removed more of the mucosa should be peeled from both sides of it farther back, in the manner described, and another piece of cartilage be removed. Though the work gets more difficult the farther back progress is made, it is nevertheless not a hard matter to dissect out the cartilage from between the mucous layers as far back as the bony septum. If the deflection has been entirely taken out in the manner described the operation is ended and the nose ready for tamponing, but if the posterior surface of the deflection extend back into the bone I begin the use of chisels as a preparation for the Roe forceps. Doubtless, in some cases the method of Krieg and Boenninghaus of removal of the bone by fragments with cutting forceps is preferable, but in my cases I have usually found it so difficult to work at this great depth within the naris that other and less tedious methods seemed preferable. The chisels I use are those employed by dentists for the cutting of enamel; any narrow-bladed

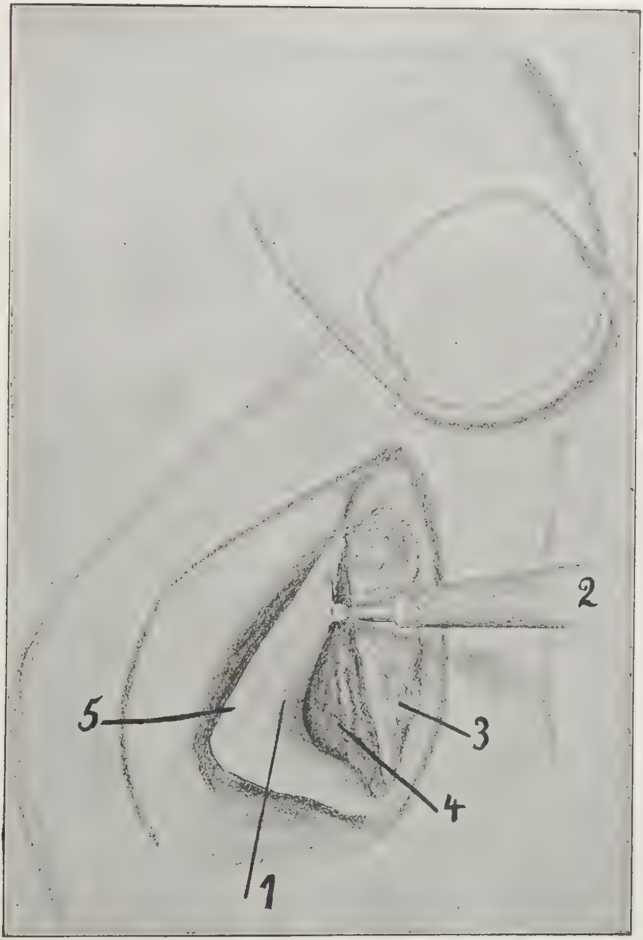

Fig. 32. Later stage of operation upon deflection shown in Fig. 31. The triangle of cartilage has been removed and shows the cut edge of the septal cartilage. 1. Hollow of deflection exposed by peeling away of the mucous membrane of the opposite nostril. 2. Freer's angular cartilage knife making downward incision at posterior part of bared deflection. 4. Inner surface of intact mucosa of opposite nostril which has been separated from the concavity of the deflection with Ingals' spud. 5. Cut edge of quadrangular cartilage. (Jour. Am. Med. Assoc.)

one will do. The chisel is applied to the white edge of the cartilaginous strip remaining in front of the bony part of the deflection and pushed back within the cartilage until it rests firmly on the anterior edge of the bone, which is usually the vomer. It is then driven longitudinally into the bone as far back as needed. The bony septum is thus easily fissured in such directions as seem desirable. It is a matter of no consequence if the chisel pierce the mucosa of the opposite side, as slits in the septum back of the denuded area of mucous membrane of the opposite nostril do not cause permanent perforations. It is easy, however, to keep the blade of the chisel from going through in most cases. When chiseling is complete I apply the largest blade of the Roe forceps that will enter the naris and fracture the bony deflection in the manner described by Roe. The use of this instrument without preliminary fissuring or trephining I have not found satisfactory. I have never succeeded in correcting cartilaginous deflections with it and have found that as soon as the forceps was removed the cartilage sprang back into its old place. For bony deflections, however, after preliminary weakening as mentioned it is in most cases an entirely satisfactory instrument. It has been my experience that some elastic septa in young subjects can not be made to break sufficiently with Roe's forceps to become straight, or that they are too resilient to break at all when it is used. In these cases the resection may be carried as far back as possible and I have found Ingals' nasal punch forceps, which makes several parallel slits through the septum, a useful instrument to destroy the resiliency. Where the bony septum is thick and massive, as it is very apt to be at the base, instead of merely weakening it with the chisel a part of its substance may be removed with this instrument or with the trephine, several cores being taken out after the manner of Ingals. Where the septum is thin and elastic it is hard to apply the trephine so that it will follow the bone as the anterior edge of this is so movable in these cases that it slips away as soon as the trephine begins to rotate. In the majority of cases perfect success may be attained with the chisel and Roe's forceps. [In a recent note Freer states that further experience with this operation has led him to discard the

Roe forceps and depend upon removal of the obstructing bony tissue with a fine chisel or a trephine. He also uses a dental burnisher instead of the Ingals spud to separate the mucosa of the concave side.]

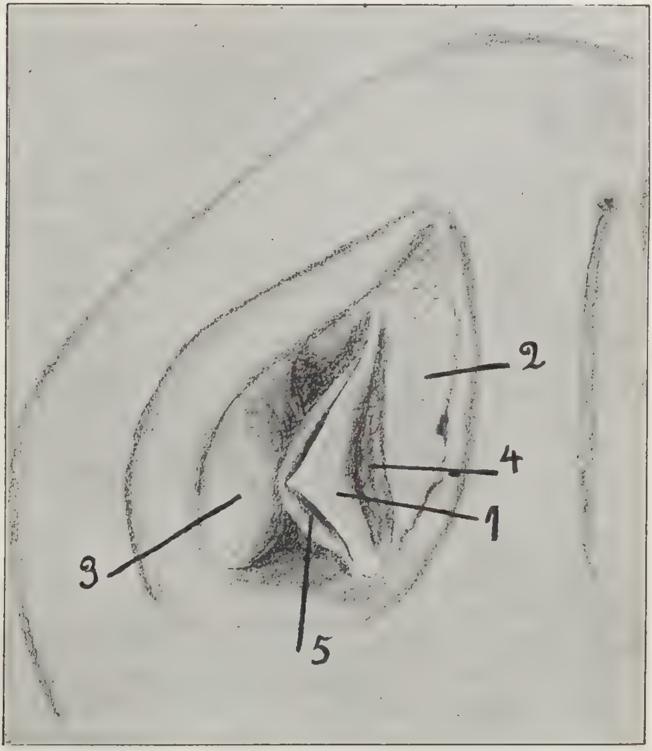

Fig. 33. Still later stage of operation. The deflection has been removed all but its posterior portion which is partly cartilaginous and partly bony. The inferior turbinated body has been exposed to view by removal of deflection. 1. Remains of deflection. 2. Reflected anterior flap of mucosa. 3. Inferior turbinated body. 4. Mucous membrane of opposite nostril 5. Separated mucous membrane of convex side of deflection, lying loose in naris.—(Jour. Am. Med. Assoc.)

"Sometimes a crest or spur in the opposite nostril makes the application of this instrument impossible or unsatisfactory. The sawing, chiseling or trephining away of these obstructions, in addition to the procedures mentioned, is a matter of course and should be done at the same time.

"The operation is not complete until the patient can breathe perfectly through the previously obstructed nostril without the use of pressure to force the septum towards the opposite naris. No tubes are needed to maintain the correction as, under the conditions established, the deformity can not recur, because the cartilaginous deflection has either been removed bodily or what little remains of it at the posterior part is held in proper position by the infracted bony portion of the septum, which shows no tendency to spring back into its old position after being broken. The after-treatment consists in packing the naris after the manner of Ingals with a long strip of lint. This it is my custom to impregnate with powdered bismuth subnitrate, as I have found that a tampon filled with this antiseptic will remain odorless and fresh for as long as ten days in the nasal cavity. Whether it would stay so longer I have not tested, but have not so far found a bismuth tampon putrid when removed. The object of tamponing is to avoid secondary hemorrhage and to make the flaps of mucous membrane apply themselves so that they will heal by primary union. Krieg and Boenninghaus remove the reflected mucosa of the convex side, claiming that it forms hypertrophic prominences later. This has not been my experience if primary union can be obtained and this results almost invariably, shortening considerably the time of healing. Previously to introducing the lint strip the flaps are neatly applied and protected from displacement during the tamponing by placing against the wound surface one of the Ingals' metal guards. The tampon is removed on the fourth or fifth day and not replaced. To avoid crusting during healing, the patient is directed to insert daily into his nostril a 2 per cent ointment of salicylic acid in lanolin and vaselin equal parts. A spray of normal salt solution is also employed by him."

Freer's paper was read before the Chicago Laryngological Society and in the discussion E. F. Ingals said: "The procedure that has been spoken of as my operation is designed for those cases in which the cartilaginous septum is bent so as to more or less close the nostril by a nearly transverse triangular plate, narrow above but from 5 to 10 mm. in width at the lower part. The operation consists of removing a triangular piece of cartilage from the front wall of this conical projection of just sufficient size so that the opening will be closed when the lateral wall of the conical projection is brought to a vertical position, but this can not be done without cutting away the lower wall or what from the front constitutes the base of the triangle. This, it should be remembered, runs upward and backward as a hard, bony ridge 2 or 3 cm. It may be cut away with a saw or trephine, but I commonly use the latter. The first incision is made from above downward and outward nearly through the middle of the triangle; the mucous membrane is reflected on both sides of this incision to uncover as large a portion of the cartilage as it is desirable to remove; the cartilage is then cut through, preferably with Sajous' knife from above downward on both sides of the triangle, care being taken not to cut through the mucous membrane on the opposite side. This piece of cartilage is then seized at its apex by forceps and drawn down, the mucous membrane being loosened from its posterior surface at the same time, and cut off at the base of the triangle. The lower wall or floor of the conical projection is next cut away with a trephine, and the resiliency of the septum is overcome by cutting through it beneath the mucous membrane with my small hook-like cartilage knife, or by cutting through it in many places with the blades of my septum forceps. The lateral wall is then pressed over to the normal plane of the septum and held in position by a tampon of surgeons' lint that is made to fill the formerly obstructed naris. This tampon is made from a strip of lint about a centimeter wide and a meter in length, that has been thoroughly impregnated with iodoform and boric acid. The flap is held in position and the outer part of the naris retracted with my bent steel nasal spatula and the strip of lint is pushed in, fold after fold, with my bent nasal scissors which take the place, for this purpose, of forceps and probe, and which by the way add enormously to the facility in packing this cavity. In destroying the resiliency of the septum I sometimes cut it through at the upper part with a small trephine beneath the mucous membrane, being careful not to cut the latter, at least on both sides at the same time, but several years ago in one case I had sloughing of the flap from such an operation on account of having destroyed the blood supply. The operation I perform where there is a good deal of thickening of the septum and a spur, as there is in most cases, is somewhat different. With a Sajous knife passed first to the farther end of the exostosis I cut through the mucous membrane from behind forward, as nearly as possible along the crest. When the incision reaches the anterior end of the exostosis it is swept forward and upward in front of the bent cartilage to the upper part of the septum. With a spud this flap of membrane is lifted off of the cartilage and upper surface of the exostosis throughout its entire length. Occasionally, we cut entirely through the septum when there is a deep furrow on the opposite side, but I try to avoid this and can succeed when the furrow is not too deep; however, if an opening is made the flap will usually cover it. I cut away the bottom of the spur with a trephine and then starting the saw at the very upper part of the spur where the septum is in the normal plane, I cut straight down to the floor. The exostosis is thus removed. Sometimes I cut downward with a saw about 4-5 of the whole distance and then insert the saw below and saw upward to meet the cut from above, but the bony tissue is so hard at the lower part of the exostosis that it is easier to cut with trephine than with saw. After the exostosis is removed, the mucous membrane that has been lifted up is applied to the cut surfaces and covers any opening that may have been made unless the opening is very large, thus a perfect result will be obtained in the majority of cases."

G. Fetterolf[1] *criticizes nasal septum operations* such as those of Asch, Watson, Gleason, Roe and Kyle. To get a septum over to the median position is simple: A few saw, knife or scissor cuts, a flap or flaps pushed over or the septum crushed, and the result is accomplished. But in many cases a septum tends to return to its original position, the trouble being that there is too much septum for the space. To remove the excess of tissue Fetterolf has devised a saw-file. Its edge is curved and

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(1) Laryngoscope, August, 1902.

consists of a series of teeth, half of which cut when the instrument is pushed and the other half when it is pulled. These teeth are prolonged up the sides which are curved on the flat and consist really of a series of planes, the distal half cutting when the instrument is pushed, and the proximal half when it is pulled, similarly, to the edge. "When anesthesia is complete a finger is introduced for the double purpose of exploration and of pushing the septum sufficiently toward the midline to permit of the introduction of the saw-file. This finger is then withdrawn, and with a finger in the concave side to act as a guide, either one or two grooves are cut through the septum, as far as the perichondrium of the opposite side. If but a slight amount of tissue needs to be removed, one groove is sufficient; if a greater amount, either two grooves are cut at some distance from each other, thus converting the septum into three strips, or else a file of wide angle is used. If the deflection is extreme, sufficient will not be removed if only the convex side be attacked, and to obviate this an additional incision, as is recommended by Kyle, is required on the concave side. This is usually made at the point of greatest angulation. In this instance, of course, the muco-perichondrium of the concave side is not allowed to remain intact. To make and to remove a still wider strip, I have had a set of the saw-files truncated. The first cut or cuts can be made as usual, and then the additional tissue is removed by using the truncated instrument, which will widen the groove, and at the same time the blunt edge will push the muco-perichondrium ahead of it without laceration. This, of course, does not remove any of the antero-posterior excess, and is, therefore, not an ideal operation. While the results so far have been quite satisfactory, in the future, whenever the conditions will allow it, I shall make the cuts so as to cross each other, and thus remove this antero-posterior redundancy. When this is extreme a portion of cartilage should first be removed by the resection method of Ingals, as advocated recently by Freer, and the operation completed by removing V-strips *p. r. n.* After the grooves are satisfactorily made, the Adams forceps are introduced and pushed to the floor of the nose. The lower fragment of the septum is broken from its basal attachment and twisted toward the opposite side—over-corrected. The other segments are then pushed over, and if two cuts have been made, a slight amount of pressure with the finger will be sufficient. The operation is finished by the introduction of a Kyle's tube. In this way is secured a correction with very little trauma, with frequently an intact muco-perichondrium of one side, with removal of redundant tissue and with breaking up of resistance at the three essential points, upper margin, lower margin and point of greatest projection.

The after-treatment consists in the first place in watching the patient carefully for six weeks following the operation. Unless there arise points of tenderness or irritation in or around the nose, the tube is not removed for five days. It is kept clean by spraying with a warm alkaline solution, which is followed by some bland oil, and is removed and cleansed at intervals ranging from two to four days. Should there be evidence of pressure at any point, the tube can readily be indented to accommodate the projection, or the edge can be trimmed away should it be cutting into the soft parts.

The *operations of Gleason and Kyle* have been described so often that we shall merely note the fact that they are described again in the *Laryngoscope* for August, 1902. In his paper Kyle suggests an important modification of his operation for cases in which the septum deflection is associated with external deformity. A small oblique incision, $\frac{1}{8}$ to $\frac{1}{4}$ inch in length, is made through the skin into the nasal cavity on the convex side of the deflection just at the point of junction of the cartilage and bone, through which a small saw, or Fetterolf's file-saw, is inserted and a V-shaped portion of cartilage removed. This should extend down on the septum far enough to break up all resiliency and the amount removed should be sufficient to render the cartilaginous portion of the nose entirely pliable. One suture and collodion over cotton for the external wound.

The performance of *septum operations under cocain and nitrous oxid gas*[1] is advocated by B. S. Booth. The nose is irrigated with solution of adrenalin chlorid 1-5000 by means of cotton and applicator; 10 per cent solution of

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(1) Annals of Otology, Rhinology and Laryngology, May, 1902.

cocain, applied in the same way for ten minutes. A sharp-pointed bistoury is plunged through the most prominent portion of the convex septum into the opposite nostril, the cutting surface of the knife directed anteriorly. After a sufficiently large opening is made a blunt-pointed curved bistoury is substituted to avoid injuring the tissues of the opposite nostril and made to cut through the warped cartilaginous septum anteriorly. The bistoury is then reversed and passed through the deflected cartilaginous septum posteriorly until the bony septum is reached. If the bony septum is included in the deviation, a small saw is now substituted and a small portion of the bony septum is divided. If deviation is confined to the cartilaginous septum, the bony septum is not included in the antero-posterior incision. More adrenalin and cocain are now applied. Nitrous oxid is given the patient in a semi-recumbent position. The septum is grasped between the blades of Adam's forceps and by a rotary movement the resiliency is carefully broken up, using care to loosen the septum from the floor of the nose; the forceps are now removed, the index finger is introduced into the nostril containing the convexity, and the septum is pushed into the opposite nostril; splints.

**Perforation.** C. W. Richardson[1] divides the cases into two groups: (1) Those with a known etiologic factor and a definite pathologic history; (2) those without a known etiologic factor and an indefinite pathologic history. Syphilis and tuberculosis are prominent in etiology. Zuckerkandl ascribed the process to a hemorrhagic change in the mucosa which he termed xanthosis. For the development of the atrophy of the septum, as well as for the ulcer, he describes the following stages: 1. Injury, prolonged mechanical irritation of mucous membrane of the septum. 2. Hemorrhage in the mucous membrane, xanthosis. 3. Destruction of the capillaries and thereby defective nourishment. 4. Partial atrophy, or perforating ulcer, after infection has or has not taken place.

## THE TURBINATED BODIES.

Schonemann enumerates the *changes in the blood vessels of the nasal mucosa in nephritis.* The number of peripheral capillaries is increased, they penetrate through the basal membrane and form loops between its epithelial cells. Soon the capillary wall, as well as the epithelial covering, ruptures and hemorrhage takes place.

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(1) Annals of Otology, Rhinology and Laryngology, February, 1902.

The *pathology of hypertrophied inferior turbinates* is discussed by Citelli.[1] Hyperplasia and hypertrophy of the lower turbinates is a result of chronic inflammation, progressing from above downward; all tissues, bone included, are affected. Connective tissue hyperplasia, when reaching a certain degree, becomes a process of degeneration, consisting in the formation of hyaline cysts and colloid bodies. The forms of hyperplasia and hypertrophy may be of four types: 1, Mixed, or fibro-angio-adenomatous; 2, angiomatous; 3, fibromatous; 4, cystic or degenerative. Hypertrophy, 1, diffuse—mixed, vascular; 2, papillary—fibromatous; 3, polypoid—cystic or degenerative.

Wroblevsky's *method of resection of the lower turbinates* consists in cutting the turbinate with shears almost through at its attachment, and severing the latter with a cold wire snare. The use of the snare is a precaution against the turbinate getting into the larynx and causing dangerous dyspnea.

J. W. Murphy[2] *removes inferior turbinate hypertrophies* as follows: Technic, in 264 cases: After douching the nose with a warm normal salt solution pledgets of cotton dipped in a 5 per cent solution of cocain are carefully packed around the turbinated body. The first pledget is carried up under the scroll-like edge of the turbinate. From six to eight pledgets of cotton are packed in. One of these is dipped in a 1-3000 adrenalin solution to control hemorrhage. They are left in for ten minutes. A fine straight saw is passed along the floor of the nose and brought up under the scroll-like edge of the turbinate. It is passed back until its blunt end impinges upon the posterior wall of the pharynx. It is now withdrawn about three-quarters of an inch, which gives the length of the stroke, and is then turned so as to cut almost at a right angle with the septum. Half a dozen strokes with the saw and a thin sliver of bone is removed from

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(1) Archiv f. Laryn. and Rhinol., 1902, H. I.
(2) The Laryngoscope, September, 1902.

the under surface of the turbinate. The author's nasal scissors are now passed in, the lower blade following the saw cut and the hypertrophied membranous portion is removed. The packing may be left out, dusting the parts with powdered suprarenal gland instead.

*Edema of the lower turbinate* in vasomotor rhinitis is discussed by Lublinski.[1] On examination the lower turbinate is found to be not only touching the septum, but pressing on it. The mucosa is ordinarily pale, secretion scanty, watery, rarely mucous. On pressure the swelling is reduced, reappearing as soon as the pressure is removed. Five per cent cocain solution will produce the same effect. Anemic and chlorotic individuals are specially susceptible to it, more often women. The most striking symptom is redness and swelling of the end of the nose. The treatment is mostly constitutional: nourishing food, iron and arsenic and physical exercise. Light massage of the swollen middle turbinate with a probe, whose end is covered with cotton immersed in $\frac{1}{4}$ to $\frac{1}{2}$ per cent menthol paraffin, two to three times a week for five to ten minutes at a time. The galvano-cautery may be resorted to, anesthetizing with 10 per cent cocain solution. Injection of "chlorzink" under mucosa, 10 per cent solution, anesthesia being produced with a 10 per cent solution of eucain. The reaction is energetic, and unpleasant symptoms disappear only in 8 to 14 days. Frequently the procedure is to be repeated in 4 to 6 weeks.

## Miscellaneous Affections.

For *probing of the ductus lachrymalis from the nasal cavity* Polyak[2] uses two series of probes; one for cases where the anterior part of the lower turbinate has to be removed; the other, in rare cases, where the probing can be done without any preliminary operation. Technic: the probe is introduced with the free end upwards and is carried to the anterior third of the inferior turbinate. The curve of the probe is pressed against the floor of the nose, the end is directed to the side and outward, under the inferior turbinate in the inferior meatus, which pro-

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(1) Berliner klin. Wochenschrift, December 30, 1901.
(2) Archiv f. Laryn. and Rhinologie, 1902, B. 12.

cedure succeeds easily where the lower turbinate is partially absorbed. The upper part is directed upwards and outwards. The probe is now carefully directed forwards to the anterior part of the turbinated, where the inferior meatus is slightly dilated upwards; the end of the probe easily enters the opening of the canal. Indications: 1, Cases not of sufficiently long standing to interfere with aspiration; 2, where the trouble is of nasal origin and probing is directed towards its removal; 3, cases where probing from above is unsatisfactory, where the stenosis is in the lower half of the duct, where the poor result depends on incomplete dilatation from above. Contraindications: 1, Where stenosis is high and cannot be reached from below; 2, extreme affection of the lacrimal sac wall where complete recovery, even after dilatation of the stricture, is impossible; 3, in nurslings and children at puberty, on account of narrow nasal openings and low inferior meatus.

**Ozena.** The etiology of ozena, or as it is generally termed in this country, atrophic rhinitis, is still a much discussed point with as yet little agreement between various investigators. Constituting as the disease does a considerable proportion of all nasal diseases which the general practitioner as well as the specialist is called upon to treat, and giving rise to a condition so disagreeable to the patient and his friends, a satisfactory solution of the question of etiology and the consequent adaptation of curative treatment is much to be desired.

Grünwald,[1] of Munich, has recently presented his views on the subject, taking the ground that disease of one or more of the accessory cavities is the etiologic factor in ozena. While the adherents of the microbe theory have been very active and have discovered some facts of much interest, yet none of the bacilli or cocci thus far studied have fulfilled the exigencies of a real pathogenesis—namely, the production of the disease in all its forms.

As to other theories on the etiology of ozena Hopmann, Siebenmann, Gerber and Cholewa-Cordes all consider the atrophy as the primary source of all the other phenomena. But it would be difficult to state a reason why the atrophy of the whole tissue or that of the mucous membrane alone

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(1) Lancet, August 23, 1902.

should produce a secretion thus altered without having regard to the improbability of an increased secretion being due to an atrophied membrane in which even the secreting glands had undergone destruction. Moreover, none of these theories discriminate between congenital wideness of the nose and acquired atrophy; the occurrence of the former alone being proved by the fact that wide noses are found without the least discharge. If a suppurative process becomes established in such a nose it finds conditions favorable to the establishment of ozena, as the discharges are likely to be retained long enough to become putrid. Even from Cholewa-Cordes's researches it follows that atrophy, of the mucous membrane at least, is not the cause, but the consequence, of the altered secretion due to the compression and irritation caused by the adherent and putrid crusts.

As regards treatment, Grünwald grants that simple local and general measures sometimes yield results amounting to practical cure. While this seems a strong objection against the statement that the disease is always due to a focal affection, he has never denied, but on the contrary affirmed, that a great many other factors are required to change the focal secretion into that peculiar to ozena. If these factors were abolished, even without removing all secretion, there would be in favorable cases apparent recovery, which practically might approach to a cure. Considering the very great difficulties of radical treatment of focal suppurations in many cases, and especially in disease of the maxillary sinus, it becomes in each single case a question for consideration whether to take the uncertain way of relief by general measures or the more certain but troublesome one of radical cure by treatment of the focal disease.

For ozena Bouroullec[1] recommends the following treatment: Thorough cleansing of the nose with forceps and probe; the patient is instructed in the use of the syringe or Weber's siphon, with one or two litres of warm water, containing as a disinfectant naphthol 30 centigrams, or resorcin 5 grams to the litre. After every lavage, repeated two or three times a day, the patient insufflates some boric acid or aristol. The writer has used the galvano-cautery

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(1). Gazette des Hôpitaux, September 19, 1901.

and electrolysis with success; the strength of the current should not exceed 12 to 14 milliamperes. (See also the article on paraffin injections.)

**Tuberculosis.** Mercier[1] removed a *tubercular tumor* of the posterior portion of the *nasal septum* by means of the cold wire snare and cauterized the tumor base with the galvano-cautery; no recurrence. As a general thing these growths affect the anterior part of the septum. The characteristic features of the sections of dense lymphoid tissue were giant cells in the center of each follicle, which were surrounded by a zone of epithelioid cells.

**Granuloma.** W. Lincoln[2] reports two cases of *granuloma* of the nose. Although similar in appearance, as to location and histologically, one of the cases was tubercular and the other due to syphilis. The reporter agrees with Herzog that the clinical rather than the histologic test should be accepted in diagnosis. Tubercular granulomata should be removed with a sharp curette, scraping down to the cartilage and well into the surrounding healthy mucous membrane. Syphilitic granulomata will yield to specific treatment but in conjunction with this, surgical treatment is not contraindicated, if the growth causes considerable obstruction.

An *unusual case of nasal granuloma* was observed by H. L. Myers.[3] Both nasal fossæ, post-nasal space and posterior and lateral pharyngeal walls, posterior surface of velum palati and uvula were involved. The growth was removed with snare and curette. Cod liver oil and iron were given.

**Osteophytes.** A note on *osteophytes of the nasal chambers* is contributed by A. W. MacCoy.[4] Osteophytes are to be found well back in the nasal chambers, underneath the lower turbinated bone, on the bony septum, and on the floor of the nose. In size they vary from a sharp spicule to a small irregular mass. Summary: 1. Under an anesthetic, with the little finger as an intelligent probe. certain osseous structures foreign to normal nasal conditions may be found. 2. These osseous masses are

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(1) Revue hebdomadaire de Laryngologie, etc., June 14, 1902.
(2) Reports of American Rhinol., Laryngol. and Otol. Society, New York, 1901.
(4) Annals of Otology, Rhinology and Laryngology, May, 1902.
(3) American Journal Medical Sciences, Feb. 12, 1902.

osteophytes, having the anatomic structure of such bodies. 3. Osteophytes, clinically, are new conditions to be considered and studied. 4. In operations for deflections of the nasal septum, lack of complete success may result from their presence. 5. Osteophytes are loose in structure and readily removed with proper instruments.

**Rheumatism.** W. Freudenthal[1] again calls attention to the subject of rheumatism of the nose. Cases which were cited by him in his paper in 1894 are again referred to and additional ones in which anti-rheumatic treatment gave relief are recorded.

**Cerebro-Spinal Rhinorrhea.** Williams and Stocker[2] report a case of this rare affection. Twenty-three cases have been described. Although rare it is highly important that the disease be recognized since ill-considered intranasal treatment might lead to dangerous results, *e. g.*, infection of the meninges through the communication which exists between the nasal fossa and the subarachnoid space. Suggestive symptoms are a one-sided continuous nasal discharge of a limpid, saltish, watery fluid of low specific gravity, which will not stiffen a handkerchief wet with it. The fluid reduces Fehling's solution but not because it contains sugar. The reducing agent is pyrocatechin. Prognosis doubtful, but cases have ceased spontaneously. Eye trouble, even blindness, is a not infrequent sequel. Osler suggests lumbar puncture as a safe procedure.

**Vicarious Menstruation.** B. E. Myers[3] reports a case of *vicarious menstruation* in a girl of 23, with severe constitutional disturbances. Her father and sister suffered with epistaxis. She began to bleed from the nose when 5 years old and menstruated only once at 13. After cauterization of the nasal mucous membrane, she began to menstruate normally; epistaxis occurred but once in 18 weeks and her general condition improved markedly.

**Neuroses.** Aronsohn[4] discusses the well-worn topic of *reflex neuroses* and succeeds in establishing conclusions not generally accepted. Irritation of the olfactory as well as of the trigeminus slows the respiration to a standstill and in certain pathologic conditions causes so-called bron-

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(1) Annals of Otology, Rhinology and Laryngology, May, 1902.
(2) British Medical Journal, October 12, 1901.
(3) Lancet, December 14, 1901.
(4) Archiv für Laryngologie, 1902, Bd. 12.

chial asthma. Reflex neuroses may be manifested, according to the writer, as headache, vertigo, pressure in the head, sneezing, migraine, neuralgia, defective memory, incapacity for prolonged mental effort, attacks of coughing, spasm of the glottis, spastic aphonia, facial spasm, mimic spasms, Graves' disease, epilepsy, enuresis nocturna, prurigo, articular pains, limitation of visual field, transitory amblyopia and amaurosis. In one case irritation of the nasal mucosa produced almost immediate desire to move the bowels in a person usually constipated. Lannois[1] describes a case in which epileptic attacks were caused by manipulation of nasal polypi. The relationship between neurasthenia and hysteria and diseases of the nose is studied by Gleason,[2] and Harland.[3] Mullen[4] also writes an instructive paper upon nasal conditions as a cause of neuralgias of the terminal branches of the fifth nerve. [The frequency with which the nose and its accessory cavities have to do with the production of pain should make the forehead mirror and nasal speculum favorite instruments in the armamentarium of the general practitioner.]

**Vertigo.** A case of *vertigo of nasal origin* is reported by Collet.[5] The case is of great clinical interest. A young man, after tingling in his nose, followed or not by sneezing, feels at the nucha an instantaneous and severe pain and falls without losing consciousness. This singular attack is accompanied by congestion, later by paleness of the face; it is followed by a prolonged state of collapse. It is a fact of physiology that a sudden irritation of the trigeminus will cause sudden death by syncope. This explains the violent pain at the nucha, pallor of the face, etc., and evidences a heightened irritability of the trigeminus. That the nasal tingling is the aura may suggest itself. This hypothesis would have for its support the facial pallor, the convulsive movements, the collapse, following the attack. It has against it the absence of complete loss of consciousness, the absence of any stigmata and manifestation of neurosis, the appear-

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(1) Annales des Maladies de l'Oreille, July, 1902.
(2) International Medical Magazine, February, 1902.
(3) Philadelphia Medical Journal, March, 1902.
(4) Texas Medical Journal, March, 1902.
(5) Annales des Maladies de l'Oreille, etc., 1902, XXVIII., Feb.

ance of the attack only at the adult age. Until further, more definite, explanation, the author suggests the term "vertigo of nasal origin" as showing no pathogenic pretense.

## THERAPEUTICS.

**Nasal Sprays.** Some of us confess to being somewhat amateurish in the wielding of the laryngeal forceps, but when it comes to the Davidson atomizer and compressed air the matter is a different one. Dunbar Roy's paper,[1] therefore, on the *use and abuse of nasal sprays* should receive attention. Sprays may be properly used for cleansing, stimulating or soothing, and their abuse consists in the medicinal substance used, the frequency with which the spray is employed and the force of the compressed air. Cleansing sprays have no place in acute inflammations. Stimulating sprays may be watery or oily; listerine, 1:10; formalid, pasteurine or borolyptol, 1:8. In oily menstruums, camphor-menthol 20 drops, iodin crystals 1 grain, terebene 15 drops, to the ounce. These are used, but moderately, in atrophic conditions. Soothing sprays are used in acute congestive conditions; a warm, benzoinated, oily menstruum, *e. g.*, albolene, is the best. The pressure should never exceed 15 pounds.

**Hot Air.** A study of the *action of hot air* on the mucous membrane of the upper respiratory tract has been made by Lermoyez and Mahu.[2] After a year's trial they report its favorable action in spasmodic, congestive, and hypertrophic rhinitis, hydrorrhea with nasal obstruction, sneezing, asthma, naso-pharyngeal catarrh, otalgia, tubal and tubo-tympanic catarrh with deafness, vertigo, nausea and tinnitus. The authors give this agent a new application in the treatment of acute coryza, hay fever, certain nervous troubles of trophic or sensory origin, and the epidermization of wounds. Complete reports of 30 cases are appended.

**Suprarenal Extract.** While the use of suprarenal extract or its derivative, adrenalin chlorid, has become general, there are differences of opinion as to its absolute

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(1) Atlanta Journal Record of Medicine, October, 1901.

(2) Annales des Maladies de l'Oreille, etc., 1901, XXVII., and June. 1902.

value. A most comprehensive paper on the subject has been written by D. B. Kyle.[1] He has given the results of his own observation and has abstracted all of the papers on the subject which were at his disposal, and to these the journal references are given. The portion of his paper in which the *therapeutic uses* of the drug are given follows: "I have seen attacks of acute coryza relieved by one or two applications, while on the other hand I have seen such cases made decidedly worse. In hay fever I have had in the majority of cases unfavorable results. In operative cases I have been able in some instances to do a practically bloodless operation with no severe secondary hemorrhage. This was, however, in cases in which the cutting did not involve deep structures. While on the other hand I have met with instances in which the application seemed to have no effect whatever in lessening the amount of bleeding, or when it did have, was followed by marked hemorrhage some hours after operation. If considerable cutting has to be done, as for example in the straightening of a septum, where it is impossible not to sever some of the larger arteries, it is certain to be followed by severe hemorrhage. This has often been referred to as *secondary* hemorrhage following the use of the adrenalin, when in fact it is the primary hemorrhage which has been delayed and comes on as a result of the passing off of the effect of the adrenalin. Personally I prefer to see the bleeding vessel, no matter how small it may be, during the operation, and to check the hemorrhage then, rather than to be called out at two o'clock in the morning to check the bleeding. Some operators obviate this by packing the nostril firmly at the time of operation. This, however, is, I think, a questionable procedure, as it is impossible to render the nasal cavity thoroughly aseptic, and the plug only serves as a nidus for infection; in addition, its removal necessitates irritation of the wound. As the hemorrhage does not come on for some three to six hours after operation, the then saturated plug is not as effective a means of stopping the hemorrhage as a recent plug, and this entails the removal of the plug and repacking.

"The question naturally arises, in regard to the hemor-

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(1) Therapeutic Gazette, July 15, 1902.

rhage following an operation in which both cocain and adrenalin have been used, whether it was due to the cocain or to the adrenalin. I believe that in either case there is sure to be reactionary hemorrhage, which will be greater in whichever instance the more marked contraction is produced. As adrenalin unquestionably produces the most marked constriction of the vasomotor apparatus, the old physiological law that to every action there is a reaction would be proportionate.

"In several cases in which I used the solution before operating I had more sloughing of tissue than the small amount of trauma necessitated by the operation should have produced. It may be unfair to charge the adrenalin with this ill effect, but I have not had the same amount of sloughing in cases in which I have not used it. When such necrosis occurs the process of healing is a slow one. For the arrest of hemorrhage after the removal of polypi and adenoid vegetations the adrenalin solution is unquestionably of great value in many cases. As a hemostatic in operations on the middle ear I think it is of much more value than it is in the nasal mucous membrane. It must be remembered, however, that there is a much less generous blood-supply to be controlled in the former case than in the latter. In simple ulcers of the septum, or of the buccal or pharyngeal mucous membrane, especially if accompanied by slight oozing, it is of great value. But as a hemostatic in nasal bleeding or bleeding following operations it is a very uncertain factor.

"Adrenalin in conjunction with formalin I have found useful in chronic suppurative otitis media, where it is a valuable aid in securing permanent drainage by keeping open the Eustachian tube. In edema of the larynx in its early stages it is of undoubted value; but since in the majority of cases the edema is secondary to some other condition and the adrenalin will not reach the primary cause, unless the latter be recognized and treated the edema is liable to return with renewed vigor.

"I have had fairly good results from its use in the treatment of diseased conditions of the accessory sinuses, especially the antrum of Highmore. In suppurative conditions, after puncturing and washing out the antrum, the application of adrenalin, 1:10,000, unquestionably retarded further pus formation. In suppurating conditions, after thoroughly cleansing, its application would prevent any absorption of toxic material. The solution acts very nicely on the edematous mucous membrane so often seen in the middle turbinate. In many cases of acute rhinitis, pharyngitis, and tonsillitis it is of great service in reducing the swelling and rendering the patient more comfortable, provided its use is not followed by secondary congestion. If, however, such should occur, it will only aggragate the symptoms which one is endeavoring to relieve. A number of writers have recommended its use in acute inflammatory conditions of the larynx, and while I have had good results in some instances the drug is too uncertain in its action to warrant its promiscuous use in this important organ.

"Its use has been recommended in atrophic rhinitis on the theory that as a secondary effect it tends to congest the tissues and improve their blood-supply. This surely supports the theory of the secondary congestion.

"Various articles written on the use of suprarenal in the treatment of diseases of the nose, throat, and ear demonstrate very forcibly what I have said as to the great variance in observations.

"Cheatham reports that suprarenal in combination with orthoform has produced excellent results in hay fever. Royce observed no beneficial results from its internal administration in hay fever. Locally at first it irritated the membrane, but later afforded some relief. Douglas had most satisfactory results in the treatment of hay fever with the suprarenal gland. He, however, calls attention to the fact that there is danger in its prolonged use, that the constant diminution of the blood-supply to the nasal mucous membrane may cause atrophy. He applied the gland in the form of a saccharated dried powder, 5 grains being insufflated in the nose every two hours.

"The experiments of Oliver, Schaefer, Cleghorn, and others show that the extract stimulates muscle tissue. They maintain that its action is direct and that it does not act upon the nerve tissue.

"Reichert calls attention to the fact that the powerful vasoconstrictor action of adrenalin may explain the abscess formation which sometimes follows its use hypodermically. This confirms what I believe to have occurred in several cases after operation, where the slough was out of proportion to the injury to the mucous membrane. In accord with my own experience Mayer reports a few cases in which a slough similar to that after cauterization followed the use of adrenalin.

"Newcomb concludes that the use of the extract seems to heighten the effect which might be expected from the local use of any drug, and while he recommends it in acute congestion he says that in certain chronic conditions it is merely a helpful adjuvant.

"Swain, in speaking of adrenalin chlorid, has said that one drawback in its use is the fact that only a limited area, that to which the solution is directly applied, is affected, and that its contractile effect is less pronounced than that of cocain. While this has been my observation in some cases, the majority of cases have shown largely the opposite action.

"Booth reports excellent results from its use in a case of nasal hydrorrhea.

"Curtis, Peters, and Chayney all recommend a spray of suprarenal extract in tubercular laryngitis, claiming that it relieves the sensitiveness of the parts and lessens the pain.

"It is recommended very highly by Floersheim for the relief of cough due to pharyngeal or laryngeal irritation. He administers it in powder form in three-grain doses.

"Swain and Osborn recommend it as an abortive treatment of tonsillitis.

"Ingals has found it highly advantageous in epistaxis, congestion and edema of the larynx, acute coryza, and chronic laryngotracheitis; while S. Solis-Cohen reports acute edema of the uvula, palate, pharynx, and epiglottis following the excessive use of adrenalin with chloretone.

"Burnett, in his paper before the College of Physicians in December, 1901, reported the most disastrous results, not only systemic but local, from the use of adrenalin chlorid, 1:1000, in the nose and pharynx. The solution was employed in the atomizer, and the strong solution was used by mistake.

"Casselberry maintains that the constriction is followed by relaxation. If this is true there must necessarily be secondary congestion of the part, and this agrees with my observations. In acute rhinitis he found that in some it afforded almost immediate relief, while in others it only increased the irritation.

"Mandeville was the first to administer the drug internally for the control of hemorrhage during nasal operations. He maintains that it was entirely successful.

"Somers concludes that it diminishes postoperative swelling. This has not been my experience, as in many instances it increased the swelling in the surrounding structures.

"Many writers recommend its use in all nasal operations and prevent after-hemorrhage by tightly packing the nostrils. Unfortunately in operating on the pharynx, tonsils, or larynx, we cannot resort to packing. I believe that the hemorrhage which comes on a few hours after operation is more severe and difficult to control than that which occurs during the operation under cocain. However, in some cases this after-hemorrhage does not occur. Royce reports its use in two cases for the control of hemorrhage during operation. Both were successful and were not followed by subsequent bleeding.

"Reynolds finds it a powerful hemostatic, and recommends its use in all forms of inflammation of the mucous membrane. Hopkins and Swain both report hemorrhage occurring several hours after operation in which the suprarenal was used.

"Bates states that its internal administration is useful in the treatment of hemorrhage of any kind. The philosophy of this I certainly cannot see. Given internally it produces a rapid rise of blood-pressure, and the supposition would be that when there is hemorrhage from a mucous membrane the suprarenal would only increase the hemorrhage on account of the rise in pressure. In spite of reports, for this reason I should hesitate to use it in pulmonary or other hemorrhage, the site of which must be reached through the circulation.

"The general consensus of opinion is that it has little if any anesthetic effect. Vansant claims that if the suprarenal solution is thoroughly applied by means of cotton-wool the usual anesthetic effect of cocain is increased and prolonged, and is equivalent to that produced by a very strong solution of cocain without the ill effects following the use of the latter. Harmer believes the suprarenal extract of great value as an anesthetic, but has found it of only little value as a hemostatic. This is in a great measure a direct contrast to the observations of the majority of writers.

"Mandeville has been able to relieve chronic nosebleed by the internal administration of the drug in three-grain doses three times daily. Moore reports a case of epistaxis associated with organic heart disease in which the local and internal use of the suprarenal gland completely checked the bleeding. Lermitte reports most favorable results obtained by its application in nasal hemorrhage in children. Fetterolf has had most excellent results from its use in a case of nasal hemorrhage where a mass of distended vessels existed. Kellogg reports a case of hemophilia in a child one year old in which the local application as well as internal administration of the drug gave almost immediate relief, in thirty-six hours. It is difficult to explain how it acts in hemophilia. According to Mackenzie in this condition there is a congenital hypoplasia of the vessel walls, including the muscular coat. Theoretically the suprarenal extract would scarcely have the desired action on the vessel wall; however, a number of cases have been reported in which it did arrest the bleeding.

"Oppenheimer concludes: It is of value only locally in hay fever; it is of value in epistaxis both of traumatic and of visceral origin; it is of value in postoperative swelling; it is of value in secondary hemorrhage; it is of value in acute or chronic local congestions. It is of especial value in all operations on the upper respiratory tract. The anemia remains one to five hours. The adrenalin prolongs anesthesia by preventing hemorrhage and loss of cocain from the tissues. It has no effect on the blood; it is non-irritating; it can be safely placed in the hands of patients; it may be repeatedly used without losing its effect. It is contraindicated in anemic processes and in conditions in which the mucous membrane has a low degree of vitality. In these conclusions he makes no exceptions.

"One case has been reported in which the adrenalin chlorid and the suprarenal gland extract were used locally or internally in the treatment of snoring. The relief experienced is easily explained, for if the solution contracted the tissue of the postnasal and nasal mucous membrane it would allow the free passage of air through the normal respiratory tract, allowing the air to pass through the nostrils, thereby preventing flapping of the soft palate. I have seen such cases relieved by it.

"As a mouth-wash, where the gums are bleeding or ulcerated, in a gouty condition, it is of great value. The adrenalin chlorid 1:10,000 diluted in equal amount of water is of sufficient strength.

"In an unsigned article in the *New York Medical Journal* of February 22, 1902, on 'A Warning Concerning Suprarenal Medication,' there are a number of points worthy of consideration, as follows: 'There is a question whether or not suprarenal may frequently cause secondary hemorrhage or induce a "doughy" engorgement of the erectile tissue of the nose worse than the original coryza. A fresh case of influenza with severe coryza is a distinct contraindication to its use. The drug sets the apertures to all the cranial sinuses gaping, and if the patient unguardedly uses his handkerchief while the mucous membranes are under the influence of the drug, bacteria will certainly be blown into the antrum of Highmore, probably into the ethmoid cells and the middle ear and possibly into the frontal sinuses as well. Cases of this kind with resultant empyema of all the sinuses named are already on record.'

"In reviewing the literature on the use of the suprarenal in various forms of diseases of the nose and throat there is such a marked difference of opinion in the honest detailed reports of the various writers that one must necessarily conclude that such difference of opinion cannot be due to faulty observation. It must be due to the difference of action and reaction of the drug. It must be taken into consideration, however, that the various writers *might* have *differed* as to the *diagnosis* of certain cases.

"In conclusion I would say this, that in my own experience with all the conditions above mentioned in which the remedy has been used, in probably 60 or 70 per cent of the cases it has been beneficial, while in the others it has either been worthless or has produced irritating effects, or brought about a condition which to my mind was as difficult to control and usually more distressing to the patient than the original condition which I sought to relieve."

Among the papers written during the year concerning the uses of suprarenal extract may be also mentioned those of A. Rosenberg[1] and L. Vacher.[2] Injected intravenously it is a powerful vasoconstrictor, increases the blood pressure, and some danger is connected with its use in certain cardiac and vascular lesions. It is useful in acute coryza, chronic and recurrent epistaxis, in removal of polypi, operations on the accessory sinuses, septum, tonsils, etc., in fact wherever it is necessary or advisable to control or prevent hemorrhage. Its use makes the diagnosis of an empyema of the various sinuses easy. [In America the solution of adrenalin chlorid, so-called, has taken the place of the ordinary extract because of its stability and the convenience with which solutions of various strength can be prepared.—Ed.]

## ACCESSORY SINUSES.

Moritz Weil[3] advocates *conservative treatment* in the pus affections of the accessory sinuses, and much that he suggests is reasonable. The ostium of the antrum is located differently in different individuals and is reached with an irrigation canula more easily in some than others. Weil has numerous canulas with various curves and when he has succeeded in introducing a particular canula, he marks on it the length between the end of the canula and the inner end of the nostril and keeps the same canula for the particular case. He claims that the cavity of the antrum increases with the improvement in the case at the expense of the lining mucosa thickened through edema, infiltration, etc. In the course of treatment any existing polypi on the middle turbinate or lateral swellings disappear with removal of the pus. The author succeeded in instructing 20 patients to introduce the canula and do the irrigation themselves, and in this way the greatest ob-

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(1) Revue hebdomadaire de Laryngologie, etc., January, 1902.
(2) Annales des Maladies de l'Oreille, etc., 1902, XXVIII.
(3) Centralblatt f. d. gesammte Therapie, January and February, 1902.

jection to the conservative treatment, frequent visits and expense, is removed. Resection of the middle turbinate is sometimes resorted to, to expose the ostium. Thirty per cent silver nitrate solution was used and still stronger solutions may be used.

The following are the methods of opening the antrum: Through the alveolar process, through the canine fossa, through the lateral nasal wall and through the middle or inferior nasal space. Objections to these are: 1st, The opening is frequently closed by granulations and has to be remade and introduction of the canula is very painful; 2d, a communication is made between the antrum and the mouth cavity, which causes annoyance to the patient and delays recovery; 3d, there is always danger of relapse and the opening has to be kept patent to the end of the patient's life.

Of the radical operative procedures the methods of Caldwell and Luc are to be preferred; wide anterior resection, curettement, use of caustics, a large opening into the nose for the purposes of drainage, and immediate suture of the wound in the canine fossa. The principal objection, communication with the mouth, is here removed. The author believes that a trial of the conservative treatment should be made (1 to 2 years) before a radical operation is suggested to the patient.

With the *frontal sinus* the drainage is so much better that irrigation every two to three days is sufficient. Opening from the nose is dangerous. External opening is indicated after unfruitful conservative treatment or in case of orbital or meningeal symptoms. The best method is that of Kuhnt, through the orbital arch, where the scar is hardly perceptible.

In connection with the *sphenoidal sinus* there is the choice between probing the ostium sphenoidale or perforation of the anterior wall of the cavity. In case the olfactory fissure is very narrow, resection of the posterior part of the middle turbinate is indicated.

Ethmoidal sinusitis is the most difficult to treat on account of anatomic relations. The treatment is mostly operative and should not be too radical, for it does not heal then. Resection of the middle turbinate and removal of polypi or osteophytes is often all that is necessary.

The after-treatment consists in irrigation of the nasal cavity and swabbing with a weak solution of silver nitrate.

In combined empyema every cavity should receive respective appropriate treatment.

Dexterity in introducing a probe into the ostia of accessory cavities of the nose is acquired with practice. The probe should have the right curve and be lightly and securely padded with cotton on the end and should be handled with a gentle touch. Two to three drops of a 5 to 10 per cent cocain solution is sufficient. With the least sign of pain, or blood, the attempt should be discontinued and tried again with more care.

The source of inflammation is the nasal mucosa in infectious diseases, especially influenza. In acute empyema rest in bed, cold sponging, cold compresses to forehead, temples, etc., according to location, hot diaphoretic drinks. Alcohol, coffee, tea and tobacco should be forbidden. The local treatment consists in irrigation of the nose with lukewarm physiologic salt solution and following it, application of 10 to 20 per cent cocain solution in the middle meatus. The irrigation should be done by the physician from the obstructed side under low pressure and not continuously. The fluid should be allowed to flow out without any effort on the part of the patient. The patient's friends should be warned of the possibility of infection of the Eustachian tubes.

When tumefaction does not prevent, direct local cocainization may be done, but often it is impossible. Antipyretics should then be resorted to. Pot. iodid should be tried. Removing pus through irrigation is the best method.

In case probing of the ostium fails and symptoms are urgent, operative interference should be resorted to: In antrum empyema, puncture through the inferior meatus; in frontal sinusitis, removal of the anterior end of the middle turbinate. Puncture of the antrum is not done for purpose of exploration, but to establish drainage, and may be repeated on the next day, if necessary. The author prefers a curved needle and uses a 2 per cent carbolic acid solution and fresh boiled water, equal parts. When acute antrum empyema is caused by infection from a carious tooth, the latter should be extracted, and if in doing this the antrum is opened, this opening should be used for irrigation.

In acute inflammation of the sphenoidal sinus the same treatment is indicated: cocainization, probing and irrigation. It is not as difficult to find the opening as is commonly believed. The anterior wall of this cavity is usually very thin and brittle and is often broken with the probe, but it is safer to find the sphenoidal ostium. When meningeal symptoms supervene, operative interference is indicated.

The diagnosis and treatment is discussed by Robert C. Myles.[1] Empyema of the antrum of Highmore is diagnosed by introduction through the hiatus semilunaris of a properly curved silver irrigation tube. The electric light is a valuable aid in diagnosis. Having the patient invert the head and requiring him to blow forcibly through the suspected nostril will demonstrate pus in the middle meatus.

The writer insists upon conservatism in treatment of the antrum. He makes large openings through the canine fossa and malar ridge and counter-openings into the inferior or middle meatus, followed by curettage of the mucosa and bare bone. The cavity is packed for one week.

For *frontal sinusitis* a silver irrigation tube is inserted into the sinus and an injection of normal salt solution brings away purulent matter. Three methods of treatment are given: Total obliteration of the sinus, either by removing anterior or inferior frontal sinus wall and every vestige of mucous membrane—for *small sinuses.* For *large sinuses,* part of the anterior wall is removed; curetting of mucosa and bare bone; large opening from the sinus to the nose with trephine and chisel. In *other cases,* removal of anterior end of middle turbinal and part of anterior ethmoidal cells and lower wall of naso-frontal canal and infundibulum.

*Ethmoidal Cell Disease.* Soft silver probe. Removal of middle turbinal and intracellular and intercellular tissue. Free drainage and admission of air.

*Disease of Sphenoidal Cells.* Removal of posterior end

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(1) The Laryngoscope, July, 1902.

of middle turbinal and anterior wall, curettage, irrigation and repeated excision of the membrane.

M. Lermoyez[1] believes that all cases of maxillary and frontal sinusitis are of *sufficient gravity to justify surgical intervention*, because of their possible effects upon brain, eye, respiratory passages and the general health. He recognizes the simple acute variety, which he would treat with menthol water inhalations and irrigation, either through the natural opening or through an artificial puncture in inferior meatus or alveolus.

In the chronic cases he endorses the method of Kuhnt-Luc for the frontal sinus. Briefly, this consists in resection of anterior wall, curettage of cavity, securing fronto-nasal drainage, widely opening the anterior ethmoid cells and closing the external wound immediately. In operating on the maxillary sinus he prefers the well-known method of Caldwell-Luc to that Dessault. In the latter operation a large permanent opening is made in the canine fossa, so that curettage is possible during the progress of healing.

**Antrum of Highmore.** *Pathology.* H. N. Hoople[2] believes that the limited blood supply to the mucous membrane explains the relative paucity of granulations and the rarity of severe hemorrhages when the chronicity of the process is considered. The trimethylamine odor, which characterizes the pus, is due to the presence of the aspergillus fumigatus. The other pathogenic organisms found in the pus are staphylococcus pyogenes aureus, bacillus pyogenes fetidus, streptococcus pyogenes, Pfeiffer's bacillus in pure culture, pneumococcus, bacillus pyocyaneus. colon bacillus, bacillus of diphtheria and tuberculosis.

Jansen[3] has modified his *operation on the maxillary sinus* in certain cases of chronic empyema, so that it bears a certain resemblance to the operation of Caldwell-Luc. When he finds the mucous membrane is in such a condition as to warrant the expectation that it may return to normal, he closes by sutures the primary opening in the canine fossa after making a large permanent opening into the nose. To accomplish this, he removes the bony nasal wall

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(1) Revue hebdomadaire de Laryngologie, August 9, 1902.
(2) Medical News, Aug. 16, 1902.
(3) Archiv für Ohrenheilkunde, 56, I., II., p. 111.

of the antrum and makes a flap, as large as possible, out of the mucous membrane of the nasal wall. The flap has its base, as a rule, forwards; sometimes, downwards; and is tamponed against the anterior wall or the floor of the antrum after the closure by suture of the original opening. The inferior turbinated body is left as a general thing; when too large, its lower border is cut off. If the ethmoid is to be attacked, the turbinated is removed. The opening between the nose and antrum cannot close and the patient is soon able by means of a properly bent tube to irrigate the sinus. The excretion of pus is at first quite profuse, but it soon diminishes. The removal of the iodoform gauze tampons from the antrum through the nose is difficult and painful, particularly the first one.

Lombard[1] describes a *forceps-chisel,* similar to Jansen's, for rapid work in enlarging the opening of the canine fossa in radical antrum operations.

Moure[2] reports a case of unilateral antrum empyema and double frontal sinus empyema with extensive *necrosis of the orbital wall,* in which a cure was effected after operation by the method of Caldwell-Luc and Ogston-Luc. Moure opposes the operations usually performed in Germany and America in which the external wall of the frontal sinus is removed.

*Bony Cysts in Antrum.* E. Lafarelle[3] reports two cases of unusual interest and discusses the pathology of the affection and its differential diagnosis from empyema. The dental cyst appears first as an elevation on the antrum floor. The osseous plate gradually becomes thinner and finally disappears, so that the cyst when it ruptures discharges its contents into the antral cavity. In less frequent cases there is proliferation of bone, so that the cyst wall is thick. These are called by Moure paradental osseous cysts of the antrum. The diagnosis of dental abscess is usually made and the error is not discovered until operation. In dental cyst no pus comes from the nose when fluid is injected through the alveolar orifice. This return flow of the injection is pathognomonic of dental cyst of the antrum.

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(1) Annales des Maladies de l'Oreille, etc., 1901, XXVII.
(2) Revue hebdomadaire de Laryngologie, 1902, p. 401.
(3) Revue hebdomadaire de Laryngologie, 1901, XXII., p. 513.

Raoult[1] discusses operative intervention in *paradental cysts in the superior maxilla.* 1. In cases of non-infective cysts, originating in the nasal fossa, the tumor should be opened in the alveolar region for enucleation and curettement and a counter opening made in the nose or sinus. The alveolar wound is then closed and drainage takes place through the nose. 2. When the cyst is infected and pus is present in the antrum, the same operation is done. We have a maxillary sinus with an accessory cavity. 3. If the cystic cavity is infected, but the antrum has escaped, great care must be taken to disinfect the former thoroughly before it is connected with the sinus.

Lindt[2] reaches the following conclusions from a study of five cases of *alveolar cysts.* Two of the five cases were diagnosed as ozena, three as dental abscess. The differential diagnosis between empyema of the antrum and cyst was established on finding no communication between the pathologic cavity and the sinus. Extraction of the diseased root and incision of the discharging cavity gave no relief, which showed that it was not simple alveolar periostitis. In empyema the secretion persists after irrigation, whereas in cysts it usually stops for some time. Therapy. Where suppuration exists, early removal of root, incision and clearing out of the cavity. When the opening closes, a portion of the anterior cyst wall should be removed, the epithelial lining should be spared and made continuous with the lining of the mouth, which should be frequently washed out. In cases of long standing, the anterior wall as well as the epithelial lining should be removed and communication established with the mouth or nose; tampons every two or three days as after-treatment.

**Frontal Sinus.** The methods of diagnosis of latent frontal sinusitis, are detailed by Geo. E. Shambaugh.[3] Inflammatory disease of the frontal sinus may be either manifest or latent. The latent form often lasts over a period of many years. Among its symptoms frontal headache is the most constant; it is intermittent in its character, coming on in the morning and disappearing towards

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(1) Annales des Maladies de l'Oreille, 1902, XXVIII.

(2) Correspondenz-Blatt für Schweizer Aerzte, July 15, 1902.

(3) Am. Jour. Med. Sciences, March, 1902.

the middle of the day, only to return with systematic regularity the next morning at the same hour. It is not a positive diagnostic sign. Of greater diagnostic significance is the tenderness on pressure over the affected sinus. Transillumination is not as satisfactory as in empyema of the antrum.

In cases of long standing, secondary degenerative changes of the mucous membrane are often found about the orifice of the naso-frontal duct in the middle meatus. A continuous discharge of pus into the middle meatus has been considered a valuable indication of frontal sinusitis. However, the final diagnosis of latent frontal sinusitis must rest upon the actual demonstration of pus in the sinus. The typical course of the passage of pus is from the frontal sinus through the naso-frontal duct into the anterior end of the infundibulum, then through the hiatus semilunaris into the middle meatus.

In case the middle meatus is free from polyps and the middle turbinated body stands well out from the outer wall, one may proceed at once to the examination of the naso-frontal duct and to the introduction of the catheter into the sinus.

Polyps, if present, should be removed, and if the middle turbinated body obstructs the view into the middle meatus or prevents the introduction of a catheter, the anterior end of this body should be resected. This operation is accomplished by the use of the cold wire snare.

With the middle meatus freely opened there are three methods of determining the presence of pus in the frontal sinus: 1. The introduction of a catheter and irrigation of the sinus. 2. The diagnosis by exclusion. 3. Making an exploratory opening into the sinus.

Catheterization of the frontal sinus: The direction of the passage is from below upward and forward. In atypical cases the passage is almost straight upward. The exact location of the orifice and the direction of the passage should be previously determined by a flexible blunt-pointed probe. When the tip of the catheter rotates freely, it is in the frontal sinus.

Where the catheter cannot be introduced, the diagnosis must be made by exclusion. When this fails, an exploratory puncture might be made. It may be made between the middle turbinated body and the septum and well in front, to avoid breaking through the cribriform plate into the brain cavity or from the middle meatus upward and outward into the sinus. The safest is an opening from without. A small incision can be made under the inner end of the eyebrow.

J. Mouret[1] emphasizes the fact that the frontal sinus may be in reality a large anterior cell of the ethmoid. Occasionally two ethmoid cells, an anterior and a posterior, assume the volume of the frontal sinus.

Luc[2] reports two cases of *leptomeningitis*, which followed radical operation for empyema of the frontal sinus. In one case the cerebro-spinal fluid showed a pure culture of streptococcus. Lumbar puncture with antiseptic lavage of the denuded (uncovered) dura are recommended in the way of treatment.

Among the most progressive of the present day laryngologists must be numbered Gustav Killian[3] and his most recent contribution to rhinology, a description of his radical operation for chronic empyema of the frontal sinus, deserves extended elucidation. The essential part of this method is the preservation of the upper margin of the orbit which may be, however, temporarily resected. The operation, like several others, requires complete removal of the anterior and interior walls of the sinus. When the anterior wall above the orbit rim is removed, the outer portions of the floor of the sinus are easily accessible from above, but the posterior part of the sinus floor, constituting a part of the roof of the orbit, can be reached but poorly or not at all. It can be, however, easily removed from below by Hartmann's conchotome after the frontal cells have been reached. In the same way the lateral parts of the sinus floor are removed. When it is possible to follow this procedure, diplopia is avoided, because the place of attachment of the trochlea, one-half a centimeter inward from the supra-orbital notch, is preserved. The absolute necessity, in every operation for chronic empyema of the frontal sinus, to reach conveniently the ethmoid cells led Killian to the resection of the frontal process of the

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(1) Revue hebdomadaire de Laryngologie, 1901, XXII., p. 576.
(2) Revue hebdomadaire de Laryngologie, July 12, 1902.
(3) Archiv für Laryngologie und Rhinologie, XIII., I., 1902.

superior maxilla, which makes control of the frontal cells and of the anterior end of the middle turbinated body an easy matter, and a wide communication between the sinus and nose can be established and the middle and posterior ethmoidal cells and the antrum of Highmore may be reached and curetted. The wound should be sutured immediately, excepting when acute complications are present, when it may be deferred for two or three days.

Jansen[1] describes his *modified operation* for chronic empyema of the frontal sinus. After opening the sinus below the supra-orbital ridge, he cuts through the anterior sinus wall at its median and lateral margins as high as possible. Especial care is to be taken that the soft parts are not detached. The anterior sinus wall is then held with a broad bone forceps and broken off as high up as possible. This flap protected by a piece of gauze is elevated so that a good view of the sinus may be had and the overhanging bone margins carefully chiseled away. The flap is then applied to the posterior wall of the sinus and Jansen contends that the cosmetic result is much better than when the anterior wall is chiseled away. Healing takes place in from six weeks (in very favorable cases) to six months. [It must be remembered that the cosmetic results after radical frontal sinus operations are never very good, the terms good and bad being only comparative ones. Of the cases seen by the Editor, those done by the new Killian method showed the least deformity.—Ed.]

G. Childs MacDonald[2] suggested a clever device in a case of old compound depressed fracture of the frontal bone, which involved the frontal sinuses. A sharp double-beveled chisel was used to free the depressed bone, which was incised at an angle of about 45° downward and forward, and the whole of the depression raised, including the periosteum and skin over it. The sinuses were plainly seen; the septum was fractured and broken off. Upon removing the elevator the parts immediately fell to their old positions. A piece of strong silver wire was wound into a spiral spring; this was placed in the cavity and the bony flaps were brought down to it. It answered admirably.

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(1) Archiv für Ohrenheilkunde, Band 56, I., II., p. 110.
(2) American Medicine, March 8, 1902.

A useful paper, containing observations as to *diagnosis, symptomatology and treatment* of frontal sinus empyema is contributed by G. L. Richards.[1] The cases described are instructive and illustrate very well the practical difficulties which are met in the treatment of this disease. While most of the cases get a certain amount of relief from the removal of the middle turbinated body, the author believes that an external operation is essential to cure, if polypi and granulations are present. The usual well-known operations are briefly described.

Thelwell Thomas[2] urges that all *unnecessary interference with the lining of the sinus be avoided.* He operates as follows: The incision is made from the supra-orbital notch, along the orbital margin on to the side of the nose, in the line of the naso-maxillary suture; the periosteum is raised and an opening one-half ($\frac{1}{2}''$) inch in diameter made with a gouge into the sinus. The muco-periosteal lining is incised and the interior of the sinus examined under strong illumination. A Panas probe is passed through the ostium frontale, threaded with silk and withdrawn. To the silk has been attached a Spencer Wells forceps and this is guided and pushed into the sinus from the nose. The blades are separated antero-posteriorly and the ethmoid thus broken down. Through this large communication between nose and sinus a drainage tube is pushed, its upper end projecting from the inner angle of the wound, which is sutured except at this angle. Irrigation is carried on until granulations almost close the aperture, when the tube is withdrawn.

**Ethmoid Cells.** In discussing the *surgical treatment of purulent ethmoiditis,* Guisez[3] enumerates the various methods: nasal, orbital, by way of the frontal or maxillary sinus, and endeavors to give the indications for and objections to each. He would restrict operation through the nose to an enclosed sinusitis limited to one or two cells and believes that the orbital operation with extensive resection of the inner wall of the orbit should be done in cases of generalized purulent ethmoiditis as soon as the diagnosis is made. The chief objections to the orbital

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(1) American Journal Medical Sciences, March, 1902.
(2) Liverpool Medico-Chirurgical Journal, September, 1901.
(3) Annales des Maladies de l'Oreille, August, 1902.

operation are the cicatrix and possible diplopia and epiphora.

E. J. Moure[1] recommends a simple but radical *operation for malignant neoplasms* of the ethmoid, where the diagnosis has been positively made. An incision is made from the lower end of the frontal bone to the corresponding naris and the tissues retracted, so as to expose the skeleton of the nose. This is resected and the ethmoid uncovered. A chisel is introduced parallel with the cribriform plate and is made to penetrate to the level of the body of the sphenoid. The ethmoid cells are then carefully curetted. Before the resection of the nasal bones the posterior nares are packed.

## THE NASOPHARYNX.

**Physiognomy.** Arbuthnot Lane[2] discusses the subject at length. By far the most important factor in determining the form of the face is the degree of development of the nasopharynx. When in a child the nasopharynx is fully developed, the upper jaw and the antral cavity it contains are correspondingly large. The lower margins of the orbit and the anterior and lateral aspects of the upper jaw are prominent and rounded; the malar bones project outward, the alveolar arch is horse-shoe shaped, the palate forms a long, gentle sweep, being almost completely horizontal above the alveolar level; the lower jaw is correspondingly well-developed; the lower incisors, in biting, close at no great distance behind the upper; the mouth, which is of a fair size, is kept closed habitually, the upper lip covering the upper incisor teeth and projecting below their free margin; the nose is fairly broad, while the nostrils are widely open, oval, and move appreciably, even in ordinary respiration. The chest is well-developed and respiration is free, the measurement of the throat varying decidedly during the process, which is normal in frequency. A good volume of air passes constantly freely and forcibly along the nasopharynx, on which fact the nasopharynx and the bones of the face depend for their full development. The vast majority of children are perfectly

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(1) Journal de Medicine de Bordeaux, July 6, 1902.
(2) The Philadelphia Medical Journal, August 16, 1902.

normal at birth and continue to develop normally during the first, second, and generally during the third year of life.

At the end of this period changes in the form of the face and especially of the jaws and palate usually first attract notice.

Breathing is abnormally rapid and very superficial; it is practically entirely abdominal. The chest, occupying a position of complete expiration, shows no variation during respiration. The breadth of the face is less than normal and the cheeks are flattened. The nose, if prominent, is very much flattened laterally, its sides concave, and it appears to spring abruptly from the face, or, if broad-based, it is hollowed laterally and vertically. The anterior nares form elongated narrow slits, which show no appreciable alteration in shape during the movements of expiration.

Owing to frequent tilting of the tip of the nose, the nostrils look more forward than in the normal condition. The upper lip is short. The mouth is kept open and the lip covers only a portion of the upper teeth. The chin recedes to a variable extent and in approximating the jaws in the normal bite, the lower incisors occupy a position behind the upper, farther back than usual. The mouth is small and the angles of the jaw are, like the chin, very imperfectly developed. The alveolar arch is compressed laterally and the palate is high, especially along the middle line, where it often makes an abrupt ascent. The height of the palate varies inversely with the development of the nasopharynx. The faucial tonsils are frequently large, as also is the lymphatic tissue of the pharyngeal tonsil. The teeth, poorly developed, are often fixed rather loosely in their sockets, and their cusps fit imperfectly upon their fellows. The tongue is small.

These conditions are consequent directly or indirectly on the absence of the developmental factor in the nasopharynx.

The next most important factor in facial development is the complete eruption of the teeth. The lower jaw varies in size with the size of the tongue.

**Morphology.** Moure and Lafarelle[1] study the *morpho-*

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(1) Revue hebdomadaire de Laryngol., d'Otol. et de Rhinol., 1901, XXII., p. 689.

*logic peculiarities of the nasopharynx* from the clinical point of view. The article deals not only with minute anatomy or findings of dissection, but contains a statement of the macroscopic variability in dimension and internal configuration of the nasopharyngeal cavity. These variations are striking not only to the eye, on sagittal sections of the head and neck, but also to the examining finger.

The work is considered under three heads: 1. Anatomic, based on sagittal and median sections of the nasopharynx in cadavers. 2. Results of an examination of 92 patients with adenoids. 3. Practical deductions from anatomic considerations as to intervention in the region of the nasopharynx and particularly as to ablation of adenoid growths.

*Observations on Cadavers.* A. 1—Volumetric variations are equally frequent and considerable in both sexes. 2. The nasopharynx of women does not appear smaller than that of men. It is in women that we meet with the largest dimensions. B.—Morphologic variations are of three principal types: 1, arched vault; 2, elliptical vault; 3, oval vault. C.—Anatomic factors of these variations: 1, height of posterior border of the vomer; 2, length of spheno-basillary surface; 3, situation of this surface and of this bony edge; 4, morphologic peculiarities of the spheno-basillary surface or the posterior border of the vomer.

*Clinical Observations.* From 0 to 15 years the elliptical form of the nasopharynx is the most frequent. This frequency decreases with increase in age. From 15 years the shape is more oval and arched; the last two types predominate in the male sex; the elliptical is most frequent in girls. Dimension varies with age and sex, but undergoes great individual variations. As in adults, we meet in children a variable prominence of the lips of the tube. In some cases they come in contact with the posterior border of the vomer. In adults this is met with but rarely. The rules of Escat were confirmed by these clinical observations: 1. The height of the nasopharynx, small in the new-born, increases with age. 2. In women the vertical diameter is smaller than in men; it is nearer to that of the child. But exceptions are very numerous.

*Practical Deductions.* Gottstein's curette is the best instrument. Adenotomy is easier in children for anatomic reasons. The curette should be directed obliquely from above down and from the left to the right, then from the right to the left, from the middle to the sides. It is a mistake to use a small curette for children.

**Pharyngeal Tonsil.** An unusual case of naso-pharyngeal adenoids is reported by Carl E. Munger.[1] Microscopic examination demonstrated fibro-cartilage, probably originating from an intervertebral disc; this was covered by loose connective tissue, containing numerous normal mucous glands. Outside this was a layer of intensely inflamed lymph adenoid tissue covered in by a layer of normal epithelium eroded in places.

Wm. R. Murray[2] emphasizes the fact that a *chronic inflammation* of the pharyngeal tonsil may exist without any obstruction to nasal respiration.

Many cases of post-nasal catarrh are due to the presence of a chronically inflamed pharyngeal tonsil. Some cases of acute and chronic otitis media have their origin in a Eustachian salpingitis, which was due to a low grade of inflammation of the pharyngeal tonsil.

In the treatment of some cases of chronic otitis media the source of the trouble may be overlooked and no permanent improvement will follow until the underlying cause be removed. If the presence of a chronically inflamed pharyngeal tonsil were more generally recognized and the tonsil thoroughly removed, there would be fewer cases of chronic otitis media.

In a study of the *retrogressive changes in pharyngeal tonsils* J. L. Goodale reaches the following conclusions: Retrogressive metamorphosis in the pharyngeal tonsils begins where connective tissue predominates, *i. e.,* in the trabeculæ and in the fibers of the capsule. It may take place along the length of the trabeculæ in the form of an irregular sclerotic process or in a more homogeneous and symmetrical way from the base of the organ to the mucosa of the free surface. In the sclerotic areas the endothelial cells of the reticulum show less proliferation and are less numerous. Later those forming the center of the follicles

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(1) Annals of Otology, Rhinology and Laryngology, May, 1902.
(2) Northwestern Lancet, Sept. 1, 1902.

are lymphoid cells which later likewise gradually disappear, till the follicle is replaced by connective tissue in which fat may be deposited. Follicles most distant from the crypts undergo the greatest atrophy, whereas, those nearest to them, especially nearest to their orifices, retain their function the longest.

**Anomalies.** *Anomalies of the nasopharynx* in two cases of purulent rhinitis with reflex neuroses are described by C. Hopmann.[1] A congenital anomaly of the nasopharynx was present, which presented in the first case a shortening, in the second, a narrowing of the nasal cavity, with an irregular escape of pus.

On account of the deformity, there was retention and decomposition of the secretion, and this, with the deficient oxygenation of the blood, brought about neurasthenia.

**Inflammation—Chronic.** W. Freudenthal,[2] in giving some suggestions to the general practitioner on the *treatment of chronic nasopharyngeal catarrh,* takes issue with the widespread opinion that the prevalence of catarrh in this country is due chiefly to the changeable character of our climate, to the large amount of dust, and to the habit of fast eating and drinking, to excessive humidity, etc. He claims it is due to inhalation of too dry air, especially in houses heated by hot-air furnaces.

*Therapy.* Ventilation for sleeping rooms and work rooms; sea-bathing, especially diving under the waves; summer residence in the mountains. In the winter let the hot water run in your bathroom till it is filled with steam, take the bath tepid and stay twenty minutes after the bath in the room as full of steam as possible. Exercise with dumb bells. Suitable swimming tanks should be provided for use in the winter.

*Local Treatment.* Polypi should be removed. When hypertrophy of turbinals is not very great, they should not be cauterized nor snared off. Treat the nasopharyngeal catarrh and the hypertrophy will disappear. With a postnasal applicator remove the dried crusts and scabs from the retropharynx, applying a mild or strong Lugol's solution to the mucous membrane of the retropharynx and, if necessary, of the pharynx.

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(1) Muench. med. Wochenschr., Oct. 8, 1901.
(2) Medical Record, August 9, 1902.

In atrophic catarrh tampons saturated with ichthyol (5 to 10 per cent) are inserted and left in for ten to twenty minutes. Sprays and douches are injurious. Inhalation of carbonic acid gas, internal massage and electric current are recommended. The two latter are combined in the use of the author's electric vibrator.

Snoring, a troublesome symptom of chronic catarrh, is due to relaxation of the soft palate. Alternate use of galvanic and faradic currents, applied directly to the velum palati, have given encouraging results. No "devices" should be used to prevent mouth-breathing.

**Syphilis.** Fischenich[1] found the nasopharynx affected only 39 times in 235 cases of syphilis of the throat, nose and ear, and in 15 of these the lesion was confined to this region. In this number the primary lesion did not figure, although in one case mucous patches were observed on the posterior surface of the soft palate.

The author cites a neglected case where the ulceration was so extensive that the spinal cord was visible to the size of the little finger nail. Pressure on the right side of the exposed cord with a cotton-tipped probe produced immediate paralysis of the entire left side of the body, which passed off on the removal of the pressure and *vice versa* with pressure on the left side. After the cicatrix had partially covered the exposed cord pressure over its right side with the probe produced tetanic convulsions on the corresponding side of the body below the arms and *vice versa* with pressure on the left side of the granulating wound. These results correspond with the cerebral experiments of Brown-Sequard on lower animals.

**Fibroma.** Heinrich Helasz[2] divides these tumors into (1) intra-pharyngeal, originating from the basilar fibrocartilage, from the superior cervical vertebræ, or from the inner lamellæ of the wing of the sphenoid; and (2) extra-pharyngeal, originating from the fibro-cartilage of the foramen lacerum anticum and from the spheno-palatine fossa. Typical nasopharyngeal polypi originate from the nasopharyngeal periosteum. Pseudo-nasopharyngeal polypi have their origin in one of the accessory cavities. They may be single or double. Originating in the nasopharyngeal cavity, they cause disturbances of the smell, hearing, speech, respiration and swallowing. They may involve the frontal and ethmoidal sinuses. From the pterygopalatine fossa they extend into the orbit and through pressure on the infra-orbital nerve, they cause neuralgia. If they originate near the foramen lacerum anticum, they may affect the large blood vessels and cause grave circulatory disturbances. They may cause death by suffocation or starvation, in young children especially meningitis may occur. Hemorrhage from the mouth or nose may be the first symptoms. Many of the patients exhibit a marked cachexia due to the anemia and the disorders caused by swallowing foul mucous discharges from the ulcerated mucosa of the growth. The writer believes that the difference in the development of the male and female cranium at puberty accounts for the greater frequency with which males are affected. The growths do not recur when their point of origin is thoroughly destroyed nor after the patient is twenty-five years of age when cranial development ceases.

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(1) Atlanta Journal-Record of Medicine, December, 1901.
(2) Wiener med. Wochenschrift, Oct. 19, 1901.

## MOUTH, PHARYNX, TONSILS.

### Pharynx.

**Acute Pharyngitis.** Philip K. Brown[1] reports an unusual case of acute primary infectious pharyngitis which was accompanied by extreme leucopenia and in which death occurred on the seventh day from edema of the glottis. On post-mortem examination the epiglottis was found greatly edematous, its posterior wall was more than half covered with a decubitus, over which the necrotic tissue lay like a loose covering. The edema had completely closed the glottis. Glands enlarged. No pus collection. Staphylococcus pyogenes albus and aureus, and bacilli coli communis were found in cultures of internal organs. Senator reported four similar cases with fatal issue.

Somers[2] observed three cases of *mixed infection* which presented features identical in several respects: the pres-

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(1) American Medicine, April 19, 1902.
(2) Medicine, January, 1902.

ence of the same bacterial agencies, the febrile phenomena and the rapid disappearance of the membrane. Malaise persisted for several days. The membrane formation and inflammatory changes were limited to regions covered by squamous epithelium, this is in contra-distinction to diphtheria where columnar epithelium is chiefly involved.

Massei has grouped the microorganisms, which in the oropharynx produce membranous exudation, into three classes: (1) Cocci—streptococcus, staphylococcus and Roux's coccus; (2) bacilli—Klebs-Loeffler, colon and leptothrix; (3) fungi—oidium albicans.

The infection is practically always mixed and the exudate is influenced not so much by the nature as by the severity of the process.

Emil Mayer[1] reports a case of *angina with salivation and dysphagia.* Both tonsils were the seat of discrete spots of white deposit, irregular in shape, reddened about the edge, easily detached, having an ulcerating and bleeding surface underneath. Between the membranous deposits was normal tonsillar tissue. The membrane was readily detached, but re-formed very promptly. A few days later a few spots showed to the left of the uvula and subsequently all the spots joined into a single mass of pearly white color, and there was a line of deposit over the gums of both upper and lower teeth.

On microscopic examination the bacillus and spirillum of Vincent were found. Areas of necrosis and areas of inflammation, with suppuration. The areas of necrosis were quite granular in appearance, with an occasional small round nucleus. Of cellular elements there were present polymorphonuclear leucocytes and a few small mononuclear cells, with a round comparatively large nucleus and no granulations. Numerous bacilli and spirochetæ and a few short chains of streptococci were found. The former two were non-motile, took basic stains but were seen best when diluted carbol-fuchsin was used.

The treatment consisted of gargles of boric acid solution and daily application of tincture iodin comp. and peroxid of hydrogen. The membrane lasted two weeks. The affection occurs in adult males and is said to be due to the use of tobacco, eruption of a wisdom tooth, defective teeth or those covered with tartar, lymphoid tendency, syphilis and mercurial stomatitis. It is mainly an affection of the tonsils, but occurs as a stomatitis. Duration from eight days to four or six weeks. Prognosis good but there is a tendency to recurrence. Differential diagnosis from diphtheria and syphilis by bacteriologic examination and history of infection. Antisyphilitic treatment in non-syphilitic cases will retard recovery. It may be ingrafted on syphilis.

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(1) Am. Journal Medical Sciences, February, 1902.

**Chronic Pharyngitis.** Angina or *granular pharyngitis* is discussed by E. J. Moure.[1] Very frequently in children granulations in the pharynx may be considered a terminal portion of the pharyngeal tonsil. Secondary granular pharyngitis in adults is caused by lesions leading to mouth breathing. True idiopathic granular pharyngitis is observed in people using their voice in excess or subjected by their occupation and habits to frequent attacks of inflammation in this region.

*Symptoms.* In a child, hypertrophy of the follicles do not point to any particular trouble. In the adult there are no definite symptoms, except when the follicles are chronically engorged, and then itching is usually present. Other sensations may be due to the general condition.

Two forms may be differentiated: one exudative, the other confluent. In making the diagnosis the primary or the secondary nature of the trouble should be made out.

*Treatment.* In idiopathic pharyngitis treatment should be instituted only where the lesion is subject to irritation.

When a nasopharyngeal catarrh is accompanied by a chronic adenitis and a pharyngitis, curettement of the granulations is the best or swabbing with iodin, followed by an alkaline wash; gargles may be used in chronic cases.

**Tuberculosis.** Veis[2] uses concentrated *trichloracetic acid* as a direct application to the ulcer. The tissue becomes blanched and anesthetic; the acid should be re-applied in four to five days and in the author's cases cicatrization has come about. Orthoform dusted on the ulcerated surface produces analgesia for 4 to 6 hours.

**Syphilis.** According to Levinger[3] the most pronounced

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(1) Jour. d. Medicine d. Bordeaux, March 16, 1902.
(2) Archiv f. Laryngol., XII., 1902.
(3) Deutsch. med. Woch., Feb. 9, 1901.

*early symptom of tertiary ulceration* of the pharynx is pain, increasing in intensity, more especially on swallowing. Intense occipital headache, earache, deafness and vertigo. The secretion from the nasopharynx is fetid and very profuse.

**Pharyngo-mycosis.** E. H. Griffin[1] reports a case in which the growth involved both tonsils, the uvula, lower margin of the soft palate and the base of the tongue. The patient's voice was seriously impaired.

The treatment of these cases is varied. Galvano-cautery, local application of solution of mercuric chlorid (1-1,000), nitrate of silver, tincture of iodin, calomel insufflations, forceps for removing the growth; tannin and chlorate of potash, borated lotion, sharp curette, followed by chromic acid, cigarette smoking. The author does not recall a case in a man. Smoking seems to be a preventive. [While the affection is more common in women, men are by no means exempt. The Editor has seen at least one case in a smoker.]

Joseph C. Beck[2] also contributes an exhaustive study of the affection and gives detailed reports of cases. C. W. Richardson[3] believes in thorough removal of diseased tissue.

**Urticaria.** Lewis S. Somers[4] recognizes *two distinct types.* (1) Where cutaneous urticaria precedes that of the mucous membrane and (2) where the mucous membrane is involved first or simultaneously with the skin. Constitutional symptoms may be severe: suffocation, cyanosis, hoarseness, pruritus, and deafness may follow. When the epiglottis or larynx is involved alarming dyspneic symptoms may supervene and a condition essentially similar to edema of the glottis results. Treatment: Cocain spray [also adrenalin chlorid], swallowing cracked ice, purgation, high colonic flushing.

**Pemphigus.** Benign acute pemphigus of the respiratory and digestive apparatus is discussed by Monford,[5] and the chronic variety by Jacob Gugenheim.[6] *Acute pemphigus* usually runs a rapid course. The patient complains of burning in the throat, particularly on swallowing saliva. The lesions may be bullæ (few), or patches, according to whether the examination is made before or after rupture of the bullæ which last two or three days. The disease may last for two weeks and one attack does not confer immunity. Differential diagnosis must be made from simple erythematous sore throat, herpes of the pharynx, erysipelas, diphtheria, secondary syphilitic angina, the effects of corrosive medicines, the hemorrhagic form from hematoma. Treatment: Liquid diet, gargles, incision of bullæ when these are large and persistent.

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(1) N. Y. Medical Journal, Dec. 14, 1901.
(2) Annals of Otology, Rhinology and Laryngology, May, 1902.
(3) Ibid., May, 1902.
(4) Medical News, March 8, 1902.
(5) Revue hebdomadaire de Laryngologie, etc., 1901, p. 337.
(6) Muenchener medicinische Wochenschrift, Dec. 17, 1901.

*In the chronic variety* the lesion is more frequently secondary, but it also occurs as a primary manifestation, with or without cutaneous involvement. The vesicles are of shorter duration than in the skin lesion and are filled with clear water-like or yellow and turbid fluid.

More frequently the lesion consists not of vesicles, but of thick, irregular, but sharply outlined deposits, resembling croupous and diphtheritic membrane, often of considerable size. The congested, easily bleeding mucous membrane, as soon as the exudate is removed, becomes covered with another deposit. In some cases the eruption is almost constant, in others it occurs at long intervals. Vesicles may be the lesion in the first, exudate in the later stage of the disease. The general appearance is usually good. Subjective symptoms: Heat and pain sensations, moderate dysphagia, fatigue in speaking, coughing on separation of the membrane, later stenosis and cachexia. The diagnosis from isolated erythema multiforme is difficult. Erythema recurs periodically every spring and fall. Prognosis is grave as far as recovery is concerned. Therapy is inefficient. Etiology is obscure.

**Pharyngeal Abscess.** Bar[1] recognizes the difficulty of diagnosis in its inception, later, swelling, redness and fluctuation make it more apparent. In young children the diagnosis is always difficult. Dysphagia, neuralgic pains and stiff neck are constantly present. The abscess is always to one side of the median line, causing a fulness of the neck of the corresponding side and a protrusion forward of the tonsil and pharyngeal wall. The pus is fetid. When unrecognized this condition is fatal from

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(1) Annales des Maladies de l'Oreille, etc., July, 1902.

septicemia or from erosion and ulceration of one of the large vessels.

By early operation success is certain. Pearson[1] advocates opening the abscess from behind the sterno-mastoid —Hilton's method.

**Accessory Thyroid.** Theisen[2] reports such a tumor occurring at the base of the tongue in a woman aged 67. The largest diameter was one and three-fourths inches.

These tumors are much more commonly found in the larynx and trachea.

**Scarlatinal Perforations.** A valuable article on scarlatinal perforations of the faucial pillars is presented by T. Hubbard.[3] He calls attention to the fact that scars and perforations of the palate and faucial pillars are almost invariably ascribed to syphilitic disease. A number of cases are described in support of his statements and the following conclusions arrived at: Special textbooks and syphilographers do not give proper credit or rather discredit to scarlatinal angina as a cause of defects and cicatrices in the faucial pillars. A deep focus of streptococcal infection, tonsillar or subtonsillar, causing necrosis of all contiguous tissue, rather than pus accumulation as in ordinary peritonsillitis, is the cause of perforation of anterior and posterior faucial pillars. The pharyngo-maxillary space is the probable location of this focus of necrosis. Scarlatinal ulceration is usually bilateral, and being often very insidious and marked by other severe systemic symptoms, the lesion is very frequently overlooked.

The treatment of scarlatinal angina must be conducted with extreme surgical thoroughness and patient persistence. Bilateral destructive otitis is a common complication of scarlatinal angina, since the dysphagia caused by throat infiltration allows regurgitation of fluids and infecting material into the naso-pharyngeal space and only by prompt healing of the throat can the hearing be saved.

**Epithelioma of Uvula.** J. F. McCaw[4] reports a case of *primary epithelioma of the uvula* and soft palate successfully treated by surgical intervention and the Roentgen

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(1) The Lancet, Oct. 26, 1901.
(2) Albany Med. Ann., October, 1901.
(3) Laryngoscope, October, 1902.
(4) New York Medical Journal, August 9, 1902.

ray. A double anode extra large German tube was used, and to prevent X-ray burns of the lower part of the face, the inside of the mouth and the tongue, a special apparatus made from sheets of block tin was devised. The sittings lasted from ten to twenty minutes.

## THE TONSILS.

The tonsils have received much less attention than usual in the year's literature, and much of what has been written consists in reports of interesting cases which are necessarily excluded from this brief summary.

**Acute Inflammation.** Acute tonsillitis, according to Goodale,[1] is characterized histologically by a diffuse inflammation of the parenchyma of the organ in the form of an increased proliferation of the lymphoid cells and of the endothelial cells of the reticulum. The crypts are filled with exfoliated epithelial cells, leucocytes, bacteria, amorphous debris and fibrin. Bacteria are abundant near the orifice of the crypt, but gradually diminish towards the base. The phagocytic leucocytes near the orifice of the crypt exhibit the greatest number of incorporated bacteria. Likewise, in the pharyngeal tonsil, near the distal surface of the folds the inflammatory process is more intense than in the depths, and the destruction of phagocytic leucocytes and the formation of fibrin is chiefly in this situation.

Floersheim claims remarkable results from the application of *tincture of iodin* in this disease. He asserts that the pain and dysphagia are relieved in five minutes. Chemically pure *methyl blue* is strongly recommended by Siredey[2] in the treatment of anginas caused by the bacillus fusiformis and spirillæ of Vincent. The pulverized article, chemically pure, is used and the application made by pressing the small roll of absorbent cotton, which has been dipped in the powder against the affected tonsil. The mouth should then be rinsed out with water to remove the disagreeable taste of the drug.

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(1) Boston Medical and Surgical Jour., Dec. 19, 1901.
(2) Annales des Maladies de l'Oreille, etc., 1902, XXVIII.

Arnsperger[1] cites a case of acute tonsillitis superimposed on *hyperkeratosis lacunaris.* This latter lesion consists of white, hard excrescences, which are firmly attached within the tonsillar crypts. They occur mostly in the young, develop slowly, without any sign of irritation. Microscopically they consist of epithelial cells, leucocytes, cocci and threads analogous to leptothrix buccalis, but give no reaction to iodin. Curettement with a sharp spoon and extirpation of the tonsils are the most satisfactory methods of treatment.

Bosworth[2] considers that the faucial tonsils are barely present in the normal throat, and when apparent should be removed as any other *pathologic growth.* He employs the wire snare and in children recommends chloroform.

**Hemorrhage.** From thirty sections of the pharynx Demme[3] concluded that post-operative hemorrhage is due to injury of the lingual artery occupying the lower one-third or one-half of the tonsil. Clinical observations show that pulsation of the tonsillar region is due to an inconstant arch of the lingual artery.

In 1849 Linhart proved that both carotids were so far from the lumen of the pharynx that their injury is impossible in ordinary tonsillotomy. If the lateral fibrous wall is injured the tonsillar or palatine artery may cause hemorrhage.

E. Escat[4] recommends tamponing of the tonsillar area combined with suture of the pillars. Dunbar Roy[5] and L. Weber[6] report cases of secondary hemorrhage following tonsillotomy, in one case five days after operation, and H. M. Thomas[7] a case where the hemorrhage came on seventy hours after tonsillotomy and was stopped only by the Lentz mouth gag.

E. H. Griffin[8] reports five cases in which the history of hemophilia was concealed by the patients in spite of careful inquiry. After operation the surgeon was caused a great deal of trouble. Morphin was the most effective treatment for the hemorrhage.

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(1) Muench. med. Woch., March 4, 1902.
(2) Medical Record, Jan. 11, 1902.
(3) Wien. med. Woch., Nov. 30, 1901.
(4) Revue hebdomadaire de Laryngologie, etc., Sept. 27, 1902.
(5) Laryngoscope, March, 1902.
(6) Ibid., April, 1902.
(7) Jour. Amer Med. Ass'n, Feb. 1, 1902.
(8) Medical Record, Dec. 7, 1901.

**Tuberculosis.** Attention is again called to the possibility of *latent tuberculosis* of the tonsils and adenoid vegetations by S. Yankelevitz.[1] He believes that tonsillar lesions are in every case secondary; they are latent, showing no characteristic macroscopic changes. Microscopic examination is not always conclusive. Bacilli are rare and search should be made for tubercles and giant cells. Latent secondary tuberculosis of the tonsils is not an unusual phenomenon. There are three modes of infection: by the sputum; ascending infection from the tracheobronchial glands through the cervical glands; infection through the blood circulation. The diagnosis is difficult and the treatment surgical.

**Peritonsillar Abscess.** The important subject of tonsillar and peritonsillar suppuration is considered by H. J. Hartz[2] and by D. M. Barstow.[3] Hartz calls attention to recent German autopsy reports which show that a chronic latent tonsillar abscess may travel by way of the lymphatics to the peritonsillar region, thence to the mediastinum and cause a purulent pleurisy, pneumonia, pericarditis or pyemia. These post-mortem investigations prove that the cocci may become encapsulated and quiescent like the tubercle bacillus. Recurring abscesses are usually situated within the pharyngo-maxillary space. The danger of gravity abscesses and possible erosion of the vessels of the neck cannot be too greatly emphasized since the pus may burrow along the vessels and thus reach the mediastinum. The obstruction of the orifices of the supratonsillar fossa and of the tonsillar crypts predisposes to peritonsillar suppuration. Early incision should be done and the abscess cavity irrigated and drained from its most dependent part.

Barstow suggests a plan of treatment used by him in ten of these cases with good results. All of the patients had had at least two attacks of peritonsillar abscess, and one of them had had no less than eight. The object of the treatment is to open up the supratonsillar recess so widely that it will drain itself freely, repair its diseased mucous membrane, and cease to be a catch-all for germs

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(1) La Semaine medicale, No. 1, January, 1902.
(2) American Medicine, April 19, 1902.
(3) Medical Record, April 19, 1902.

and debris. A 4 per cent solution of cocain is injected from a hypodermic syringe into the body of the tonsil and into the peritonsillar region, through several points in the anterior pillar. Then with a bistoury, a curved incision is made from above downward dividing the plica triangularis at its base from the anterior pillar. Next with a Myles' tonsil punch the entire upper part of the tonsil is removed piecemeal, together with a part or the whole of the plica triangularis.

**Cysts.** The formation of *cysts in the faucial and pharyngeal tonsils* is described by J. L. Goodale.[1] In the faucial and pharyngeal tonsils cystic growths have been reported of varying size, which have been supposed to arise as the result of inflammatory processes. The precise mechanism of their production has not, however, been explained. In the faucial tonsils they have been observed after inflammation or partial excision of the organ. In the pharyngeal tonsil it is supposed that adhesion of the surface of the median folds takes place, converting the median furrow into a canal open at both ends. When the mouth of this canal becomes closed, retention of its contents ensues, with resulting cyst formation. In the faucial tonsils cystic dilatation appears somewhat common, but it does not as a rule attain a large size, probably for the reason that the organ is favorably situated for examination and operative treatment. In the pharyngeal tonsil the condition is more apt to escape observation. We usually find a cavity lined with stratified pavement epithelium in the interior of the adenoid, lying directly below a short, abruptly terminating furrow or crypt, the mucous membrane at the base of the latter extending nearly to the wall of the cavity. The cavity represents a former portion of the crypt and has been cut off by the adhesion of the walls of the latter near its orifice.

**Malignant Disease.** F. E. Hopkins[2] contributes a useful paper on this subject. Males are much more subject to cancer than females. Epithelioma of the tonsil quickly ulcerates, forming flat plaques or deep and foul ulcers. Carcinoma in its progress tends to invade tissue forward toward the base of the tongue, while sarcoma extends

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(1) Boston Med. and Surg. Jour., Dec. 19, 1901.
(2) Boston Med. and Surg. Jour, Oct. 17, 1901.

backward. Sarcoma also penetrates the tissues of the neck, and in both forms the cervical glands become early involved.

*Symptomatology.* Sarcoma; insidious onset, mechanical interference with respiration, phonation and deglutition, increased flow of mucus, hemorrhage. The symptoms are the same in carcinoma, pain being an earlier and more troublesome symptom, cervical lymphatics are involved earlier, and ulceration occurs earlier.

*Diagnosis.* Unilateral involvement of tonsil in an adult, of recent development; differential diagnosis from simple hypertrophy, syphilis, tuberculosis, phlegmon.

*Treatment.* Removal by internal or external operation. Enucleate the tumor with the finger and blunt instruments, if the case is seen early and before the surrounding structures are invaded. Remove cervical lymphatics if involved.

When this stage is passed, the external operation should be performed. Palliative treatment has also been used.

**Instrument.** A *self-retaining tongue depressor* is described by H. P. Mosher.[1] The author found the instrument in a Boston shop and could not learn the inventor's name. It was a simple spring merely, one end of which catches at the tongue and the other under the chin. It is applied and taken off by pressing on the two sides, just as is customary in working any spring clasp. On trying the instrument it worked nicely for holding the tongue down in the middle line, but it would not stay in place

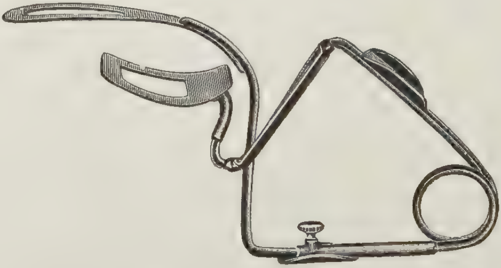

Fig. 34. Side view of tongue depressor. To open: press on the two finger plates.

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[1] Boston Med. and Surg. Jour., August 7, 1902.

on the side of the tongue. By pivoting the chinpiece so that it could swing on a horizontal axis and catch on the side of the chin, the author found this improvement accomplished. The length of the blade was made changeable. Owing to the pivoting of the chinpiece, the depressor will lie on the side of the tongue and expose the tonsil to its base.

## LARYNX.

In discussing the *spinal accessory nerve* and the innervation of the larynx, Onodi[1] reaches the conclusion that the nerve does not supply the larynx, but only the trapezius and sterno-cleido-mastoid muscles. From the inferior vertebrates to man the muscles of the pharynx and larynx are supplied by the vagus.

**Epiglottis. Functions.** The following objections to the old theory of the epiglottis acting as a lid to the glottis are presented by Knowles Renshaw:[2]

1. The muscles attached to the epiglottis, consisting of a few fibers of the aryteno-epiglottideus and part of the thyro-arytenoideus externus, are very weak and do not seem capable of bending the cartilage transversely, as it would be necessary for them to do in order to depress it over the larynx. Their function seems to be to draw back the two lateral margins of the epiglottis and to make the aryepiglottidean folds tense.

2. Persons in whom the epiglottis has been removed or has disappeared owing to destructive ulceration have little or no difficulty in swallowing solids, and only slight trouble with liquids, thus proving that the ingesta may be prevented from entering the larynx in the absence of the epiglottis.

3. The epiglottis is frequently irregular in shape and so folded upon itself that it could only with great difficulty be bent far backwards, and would then form a most inefficient lid to the larynx.

4. A case of corrosive acid poisoning has been described in which the only part of the epiglottis found to be eroded was the "laryngeal surface of the petiolus" a posi-

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(1) Revue hebdom. de Laryngologie, 1902, p. 273.
(2) British Medical Jour., July 19, 1902.

tion which should have been completely protected by a depressed epiglottis.

Professor Anderson Stuart in 1892 maintained that the epiglottis did not fold down in a lid-like way, but that the occlusion of the lower air passages during deglutition depended entirely on the movement of the arytenoids, which were approximated and moved forwards, thus coming into contact with each other and with the base of the epiglottis. The closing of the laryngeal entrance was at the same time assisted by the upward and forward movement of the entire larynx. But this theory is incomplete since it suggests no movements, active or passive, for the epiglottis, which undoubtedly does not remain stationary throughout the process of deglutition.

In tolerant people it is possible to observe the act of swallowing with the laryngoscope *in situ*. The various movements are as follows: As the tongue moves backwards towards the pharyngeal wall the arytenoid cartilages commence to slide inward and forward towards the cushion of the epiglottis and at the same time the entire larynx is lifted upward and somewhat forward, thus opening the mouth of the esophagus. The epiglottis partakes of this upward lift of the larynx to some extent. It lies closely pressed against the posterior surface of the tongue, as this travels backward, and with it cuts off the view of the forward movement of the arytenoid cartilages when about half of the distance to the cushion of the epiglottis has been traveled by them. It continues to occupy the same position, being pushed backward by the tongue until when last seen it is lying between the posterior pharyngeal wall and the tongue in such a position that it is almost impossible for it to be drawn further down so as to cover the larynx. When it reaches this position the danger of the bolus entering the larynx has passed. During this backward movement of the epiglottis its lateral margins are drawn backward and downward by the aryteno-epiglottidean muscles, thus making the posterior surface of the cartilage more concave from side to side.

When the epiglottis first comes into view again as the constrictors relax it occupies the same position as when last seen and returns to its normal position as the tongue comes forward. Throughout the entire movement, excepting for the incurving of its margins, the epiglottis plays a passive part, and all its movements depend on pressure exerted on it by the tongue.

The epiglottis is placed as a natural shield to the glottis, receiving the mucus and other secretions upon its convex anterior and upper surface and deflecting them laterally into the two sloping pyriform fossæ, by which they pass easily and readily into the esophagus. This seems to be the natural and most important function of the epiglottis. The only function of the epiglottis during deglutition is that of a slight lateral protection to the glottis. The influence of the epiglottis over phonation is at present undetermined.

**Cyst.** M. Senator[1] reports a case of cystic tumor of the epiglottis and discusses the *function of the epiglottis* in swallowing. The only symptom present was dysphagia. The tumor was the size of a ripe plum. On removal with a galvano-cautery snare it was seen to have originated from the epiglottis and two-thirds of the latter was removed with the growth. It was a cyst with turbid, colloid and putrid contents.

*Pathologic Findings.* The large cyst was covered throughout with epithelium. Its wall where thickened consisted of connective tissue, cartilage, numerous mucous glands, follicles and blood vessels corresponding exactly to the epiglottic tissue. In the rest of its wall connective tissue. The epithelium was covered in its thickened portion with ciliated epithelium, an intermediate type passing into flat epithelium. The cyst contained a granular detritus of large flat polymorphous epithelium and some small round cells filled with fat. No pus corpuscles.

The patient could swallow without any difficulty right after the operation, showing that this function can be performed without the epiglottis, as may be observed in syphilitic cases.

**Laryngeal Stridor.** Congenital laryngeal stridor is fully discussed by Prosper Merklen and Albert Devaux.[2] Some infants at birth or soon after it breathe in a peculiar manner, the inspiration being accompanied by a sonorous

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(1) Deutsche med. Wochenschr., March 6, 1902.
(2) Gazette des Hôpitaux, June 7, 1902.

and continuous sound without any concomitant signs of dyspnea. It was first mentioned by Rilliet and Barthez in 1853.

The etiology is obscure except that it is more frequent in boys. The benign character of this malady accounts for the scarcity of necropsy material on the subject. There is commonly a malformation of the laryngeal vestibule. It is the epiglottis and the aryteno-epiglottic folds that are mostly affected.

In most marked cases the subglottic portion has a completely changed aspect. The epiglottis is devoid of its normal curves. It is folded in its long diameter, the ends approach each other and it assumes the shape of a curved roof. In other cases again the aryteno-epiglottic folds have lost their consistence, and its free ends, thin and flabby, nearly touch.

The upper part of the larynx is contracted by protuberances, obstructing its lumen, capable of vibrations playing the rôle of supplementary vocal cords.

In the second variety where the changes are less marked they always affect the epiglottis and its folds. Instead of being folded in its long diameter, it is rolled on itself like the end of a flute; the aryteno-epiglottic folds approach only anteriorly and this "ensemble" vibrates under the effect of air.

*Pathology.* 1. Some suppose lack of development of cortical centers of respiration, especially of the larynx. There is glottic spasm through incoordination. 2. Muscular spasm, at the glottis or subglottic region. To this phrenic spasm is added. Spasm of the vocal cords. 3. Irritation of the nerve terminals of the mucosa, due to inflammation. 4. Robertson claims that it is due to paralysis of the posterior cricoarytenoid muscles, their antagonists by their contraction causing occlusion of the glottis. 5. Pressure caused by the Thymus. 6. Anatomic changes. 7. Cicatrical bands across the lower vocal cords. 8. Brain lesion, causing anatomic deformity, it being acquired and not congenital.

*Symptomatology.* From birth the child has stridulous respiration, it may set in a few days or even two weeks after. It is characterized by modifications in the respiratory timbre, which becomes musical. Inspiration becomes sonorous. The sound is at first low, becoming sharp and musical. It takes place when the child's head lies low, in nursing, when it is subjected to heat and then cold, when nares are pinched, in yawning and under the effects of chloroform, in excitement and coughing. With the respiratory disturbances the voice and cough are not changed. Course: The stridor increases in intensity the first two or three months; then it keeps stationary to the eighth and then gradually disappears. Relapses may occur.

*Complications.* There is a disposition towards bronchitis, and pigeon breast may develop. Diagnosis presents no difficulty. But as this affection is rare mistakes are frequently made. Differentiate from stridulous laryngitis, catarrhal laryngitis, croup, essential spasm of infants or phreno-glottic spasm, congenital retraction of the larynx, hereditary syphilis, paralysis of the dilators of the glottis, retro-pharyngeal abscess, adenoids. Prognosis is favorable.

Treatment is symptomatic and hygienic. Bromids, strychnin, warm baths, inhalations of eucalyptus, antisepsis of the pharynx and nasal fossæ.

**Arthritis.** Monnier[1] reports a *double arthritis* of the crico-arytenoid articulation in a case of grippe. The detailed description here presented is an indisputable proof of the existence of arthrites of the larynx, doubted by some, who look upon cases like this as a neurosis rather than an arthritis.

Doubt is out of the question in this case, for the infection, which clearly originated in the crico-arytenoid articulations, and was checked locally by the use of salicylate of soda, continued as a broncho-pneumonia and ended as a pericarditis.

*Diagnosis.* 1. Intense pain on deglutition. 2. Intense pain on efforts at phonation. 3. Unbearable pain at the slightest pressure on the lateral portions of the cricoid are pathognomonic when present with other symptoms, as aphonia, attacks of suffocation, fever and almost sudden onset of the affection.

**Tuberculosis.** The primary form of laryngeal tubercu-

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(1) Ann. des Maladies de l'Oreille et de Larynx., 1901, XXVII.

losis is believed by P. S. Donnellan[1] to be more frequent than generally supposed. Diagnosis depends on history, temperature, laryngoscopic examination and the finding of tubercle bacilli. Absence of bacilli in scrapings and sputum is inconclusive. Trudeau says the tuberculin test is of value when there is no fever. According to Bonfiglio there may be infiltration of the mucosa or submucosa, or excrescences, or vegetations. The infiltrations are granular, rich in cells, vascular and contain a few giant cells and small tubercules. The vegetative form preserves for a long time its epithelial investment. The connective tissue shows granulomatous structure, and here, too, tubercles may be seen.

Maurice Perrin[2] finds the disease rare during early years. In 325 cases of pulmonary tuberculosis, laryngeal tuberculosis occurred in 0.91 per cent—1.2 per cent.

Lesions are more frequent than clinical manifestations, being latent in half the cases. Frequency increases with age. Pathogenesis in order of decreasing frequency: 1. Secondary to pulmonary form. 2. Through blood and lymph streams. 3. Primary. 4. Secondary to pharyngeal infection. Symptoms are hoarseness, dysphagia, pain and attacks of suffocation.

A study of 25 cases complicating pregnancy is presented by Arthur Kuttner.[3] Hereditary predisposition not proven in all. Three had pulmonary tuberculosis before pregnancy. In twelve the pulmonary lesion was doubtful. In one the laryngitis preceded conception, in two it appeared in the sixth month, in twelve during the first half of pregnancy. One patient with an apical lesion and one with laryngeal tuberculosis who were free from symptoms for three or four years relapsed and died shortly after delivery.

None of the cases seems to have gone to full term. Four reached the ninth month, eight the eighth and three the seventh. Eight infants died within three weeks. With the appearance of infiltration the patient must be informed of the gravity of the case and with her permission tracheotomy performed. If this be inefficient, abor-

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(1) Amer. Medicine, Oct. 12, 1901.

(2) Rev. hebd. de Laryngologie, d'Otologie et de Rhinologie, 1902, p. 65.

(3) Ann. des Maladies de l'Oreille et de Larynx., 1901, XXVII.

tion is induced. In advanced laryngitis tracheotomy should be done before delivery or all preparations be made for it to prevent sudden asphyxia.

Sea Air. Massier[1] discusses the effects of sea air. The climate of the southeast coast of France, Cannes to Mentone, adds to the hygieno-dietetic treatment, a mild temperature without sudden changes, an intense sun and light, a southeast exposure sheltered from north and west winds, luxuriant vegetation and a calm sea. These, added to the usual sanatorium treatment, are more efficient than the climate of altitude. In the early stage local nutritive activity is stimulated, the hyperemia subsides and the pain diminishes.

In the second stage, local infiltration and limited ulceration sometimes cicatrize. Good general health is requisite for this improvement.

In a second paper on the *diagnosis and treatment of laryngeal tuberculosis* P. S. Donnellan[2] treats the subject along the usual lines, his paper containing nothing new. Tubercular laryngitis is usually secondary to tubercular infection of the lungs or other organs, though many cases of undoubted primary laryngeal tuberculosis have been recorded by competent observers. In advanced cases dysphagia is the most distressing symptom. Impairment of voice, cough, expectoration of mucus, pus or blood with fever, rapid pulse and respiration and night sweats are usually manifest.

Among the earliest laryngoscopic signs is a diffuse hyperemia of the larynx, succeeded by infiltration of the mucous membrane beginning usually in the inter-arytenoid space, in either arytenoid cartilage, on the laryngeal face of the epiglottis, or in the vocal cords and ventricular bands. The infiltration is usually unilateral, but autoinfection may take place. When the mucosa and perichondrium are involved, the crescentic edge of the epiglottis may be so edematous as to form a sausage-like or turban-shaped tumor. There may be a tendency to ulceration on the arytenoid or epiglottis, more rarely on the vocal cords and ventricular bands. Differential diagnosis from carcinoma and syphilis.

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(1) Ann. des Maladies de l'Oreille et de Larynx., 1901, XXVII.
(2) Medicine, March, 1902.

Hygienic and climatic treatment the same as in pulmonary tuberculosis.

*Local Treatment.* The throat is anesthetized by a cocain solution and intratracheal injections of creosote menthol solution in olive oil used. In infiltrations, submucous injections of minimum doses of pure guaiacol or creosote with a special syringe. When ulcerations are present, nothing has been so successful in the hands of the author as the use of lactic acid after the method of Krause. In extreme dysphagia rectal feeding; in impending suffocation, tracheotomy.

Treatment is also discussed by J. Price-Brown.[1] When ulceration exists and the tissues are partially necrotic or destroyed, fluids are often difficult to swallow on account of their tendency to enter the imperfectly protected larynx. To obviate this, semi-solids or thick demulcents should be given. The latter are best taken in gulps, like raw, unbeaten eggs. Two ounces of raw beef, free from fat and gristle, are put through a mincing machine and intimately mixed with the yolk of an egg. This can be taken in the worst cases of dysphagia.

Wolfenden instructs his patients to lie on a lounge with the face downwards over the end, the hips being elevated by resting on the knees. The patient then sucks the food from a tumbler through a rubber tube. By this means swallowing can be accomplished, the force of gravitation keeping the food out of the larynx. When laryngeal tuberculosis is purely secondary to pulmonary disease an elevated region of several thousand feet above the sea offers the best conditions for the arrest of tuberculosis. When tuberculosis has been preceded by laryngeal catarrh an atrophic condition of the upper air passages is often indicated. In such cases a sojourn in a favorable climate by the sea, or a prolonged ocean voyage, may be of the highest benefit. There are six different conditions which the tuberculous process may assume in the larynx: anemia, hyperemia, infiltration, ulceration, necrosis and new formations or growths.

In anemia the spray treatment is the best (menthol in albolene in from 1 to 5 per cent), steam inhalations. In hyperemia the sprays and insufflations should not be quite

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(1) Canadian Journal of Medicine and Surgery, February, 1902.

so stimulating. In infiltration methods vary. Many believe that until ulceration has occurred operative treatment is never required save for acute or chronic stenosis.

Shurly, Lake and Bronner unite in recommending operative interference. Submucous or interstitial injections are recommended by some. In ulceration—lactic acid. The "progressive use" of menthol (1 to 10 per cent) reduces ulceration. Insufflation of powders; Krause and Heryng—curette; Gleitsman—galvano-cautery; electrolysis, and intra-tracheal injections are discussed.

The *essentials in treatment* of laryngeal tuberculosis are summarized by Robert Levy.[1] First stage, improve nutrition of parts by local and general treatment and facilitate absorption of infiltrations. For soft papilloma, curette, forceps and lactic acid. In firm fibroid infiltration, local application of iodin-bearing products.

In stage of ulceration in sluggish, painful ulcer, stimulation by curette and lactic acid, followed by application of iodoform. In the active superficial variety, with edema, soothing palliative and antiseptic treatment. Cleansing followed by a weak cocain or eucain solution, and then insufflation of powder of morphin, tannic acid and iodoform. Should ulceration remain, radical surgical measures. In extreme ulceration use of menthol-orthoform emulsion. Attention to general health.

R. Freitag[2] and H. Naumann[3] believe that laryngeal tuberculosis is very beneficially affected by absolutely *refraining from the use of the voice.* They go so far as to claim cures under this treatment for the larynx even when the pulmonary tuberculosis persisted. In carrying out the treatment the physician must exert a strong psychic influence over his patient and his powers of persuasion and tact are frequently taxed to the utmost. B. C. Bell[4] emphasizes the *danger of contagion* in laryngeal tuberculosis before the trouble has been diagnosed.

A *prophylactic screen* for use in the treatment of tuberculosis of the larynx and pharynx is described by Stephen W. Wells.[5] The screen consists of a sliding iron upright

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(1) Ann. of Otology, Rhinology and Laryngology, May, 1902.
(2) Muenchener med. Wochenschrift, 1902, No. 19.
(3) Ibid., 1902, July 8.
(4) The Canada Lancet, November, 1901.
(5) New York Med. Jour., Feb. 22, 1902.

set in a weighted base. At the upper end of the upright is attached a metal frame holding a glass plate 13x15 inches which can easily be removed and cleaned. The frame is attached to the upright so that when in use the right arm is but one-third the length of the left arm. This arrangement permits considerable freedom in handling the instruments on the right, while the left hand is passed under the screen, thus easily controlling the laryngoscope. Cultures made of deposits on the screen contain virulent bacteria in abundance.

*Gastrotomy for the relief of painful deglutition* incident to tubercular laryngitis is recommended by Edward Martin.[1] An incision was made to the left of the middle line, the stomach seized with forceps and drawn out until a pouch presented itself of sufficient length to be carried upward over to the costal border. Another incision was made above the costal border, the muscles were tunnelled and a vulsellum forceps passed through this second incision seized the pouch until its end presented beyond the skin. The abdominal incision was then closed without suturing the stomach to the parietal peritoneum at this point and the operation completed by suturing the stomach wall to the skin borders of the upper incision, after which a catheter was introduced into the stomach. The whole procedure requires a very few minutes, is easy, safe and unlikely to be followed by unpleasant consequences.

**Diphtheria.** Two cases of *laryngeal diphtheria in the adult* are reported by Chas. Porter.[2] Both cases, in spite of tracheotomy and antitoxin, were ultimately fatal. Klebs-Loeffler bacilli were demonstrated in both cases. On account of the greater volume of the larynx the course of the disease in adults is usually considerably more protracted.

**Typhoid.** An unusual sequela of typhoid, *ulceration and abductor paresis* is reported by D. J. G. Wishart.[3] There were symptoms of laryngeal irritation with hoarseness and anxious expression and marked tracheal tugging. Extreme anemia of oropharynx extending to parts bounding the laryngeal vestibule. The vocal cords were almost

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(1) Therap. Gazette, April 15, 1901.
(2) Edinburgh Med. Jour., April, 1902.
(3) Canada Lancet,

in contact and the patient could abduct them only slightly. They were congested, swollen and nodulated; the left cord had a notch at its posterior extremity, filled by a pure white slough, with edges congested, uneven and undermined. The right arytenoid was swollen on the external surface.

Steam inhalations. Menthol and cocain oily spray internally and cold packing externally were ordered. Dyspnea recurred. On examination a distinct crevice was found between the slough and the cord. Abduction was more deficient and the rima glottidis was simply a narrow slit. Tracheotomy was advised, should the breathing continue embarrassed. The patient shortly became unconscious, insensible and almost moribund. Tracheotomy was done and artificial respiration carried out. Then a tent-bed with steam inhalations and vaporized lime water. This was followed by steady improvement. There was no pain, no hemorrhage, no perichondritis.

**Accessory Thyroid.** Walter A. Wells[1] reports a rare case of tumor of the thyroid gland in the larynx as shown by microscopic examination.

**Compression Cough.** J. Garel[2] calls attention to a *cough similar to that of pertussis,* but differing from it by being more resonant and of a deeper tone. It is described as a hacking, hysterical, nervous, violent or savage cough. Garel noticed this cough in patients suffering from mediastinal tumors and in children presenting signs of tracheo-bronchial adenitis, causing compression of the bronchi. Radiography is of great assistance in the diagnosis of cases of this kind.

**Paralysis.** A. Cahn[3], in considering peripheral neuritis as the commonest cause of paralysis of the larynx of tabetic origin, asserts that the greater number of tabetic laryngeal paralyses, unilateral and bilateral posticus, as well as recurrent paralysis, occur in late cases of locomotor ataxia complicated with disturbance of the nerves of the head. But they often occur, like the laryngeal crises, as premonitory symptoms. In the majority of cases of tabetic

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(1) Annals of Otology, etc., August, 1902.
(2) Ann. des Maladies de l'Oreille et de Pharynx., 1902, March, XXVIII.
(3) Deutsche Arch. f. klin. Med., Feb. 22, 1902.

laryngeal paralysis the peripheral nerves are mostly affected.

Summary: 1. (a) Isolated degeneration of muscles. (b) Degeneration of the recurrent nerve alone. (c) Degeneration of the recurrens and vagus in the region of the neck, or to the medulla, or finally in the same, with the nuclei normal. 2. Of nuclear lesion only a few cases are known; only in one case the lesion of the nucleus ambiguus was positively proven. 3. With nuclear lesions a peripheral nerve degeneration was regularly found, often being more important that the first. 4. The clinical picture shows in the cases, where a peripheral lesion was alone present or prevailed, a median position of the vocal cords. This is also the case where paralysis and atrophy involves other inner laryngeal muscles besides the crico-arytenoideus posticus. 5. On the contrary, in cases of nuclear atrophy the clinical picture is changeable, unilateral and bilateral cadaveric position, median position and disturbed sensibility.

Resection of the recurrent was resorted to for the dyspnea due to median fixation of the vocal cords. Its object, to obtain cadaveric fixation through paralysis of other muscles, was not attained, as the once-shortened adductors would not become lengthened again through the absence of efficient antagonists. The vocal cords remained in median fixation.

J. Sendziak[1] emphasizes the *importance of an examination of the larynx* in cases of aneurism of the aorta. Paralysis, partial or complete, of the recurrent laryngeal nerve is a very frequent and what is more important in many cases one of the earliest signs of aneurism of the aorta; the Roentgen rays in these cases, where there are no distinct symptoms of aneurism of the aorta, generally confirm the diagnosis of this disease made on the basis of laryngoscopic examination. In these cases at first there is partial paralysis of the recurrent nerve, which manifests itself by paralysis of the crico-arytenoid muscle. This passes into complete paralysis of the recurrent nerve, which is caused by increased pressure of the aneurism on the inferior laryngeal nerve, so that not only the nerve fibers passing to the abductor muscles of the glottis, but also

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(1) Journal of Laryngology, Rhinology and Otology, August, 1902.

the remaining fibers innervating the adductor muscles are involved, and before all the muscle of the vocal cord. This change is represented in the laryngoscopic picture by the cadaveric position of the vocal cord.

J. W. Gleitsmann[1] discusses in an interesting way *laryngeal paralyses* and their *importance in general medicine.* The larynx has to perform two antagonistic functions: 1. Phonation when the glottis has to be closed; 2. respiration when it has to be open. The laryngeal center is in the cortex cerebri, the respiratory center in the bulbus. In addition both functions have subordinate centers in the reverse order, viz., phonation in the medulla and respiration in the cortex.

The superior laryngeal is the sensory nerve of the larynx and sends only motor fibers to the crico-thyroid muscles; the recurrent is the motor nerve for all intrinsic muscles of the larynx and innervates adductors as well as abductors. These nerve fibers run in separate bundles through the whole length of the recurrent. The adductors recuperate earlier and more quickly than the abductors. In a a case of recurrent or abductor paralysis we should look for a lesion of the nerve trunk.

Etiology: Hysteria, puberty and pregnancy, psychical influence, traumatism, symmetrical tumors, syphilis, tuberculosis, softening, etc. Pseudo-bulbar paralysis is more frequently observed, laryngeal muscles undergoing no fatty degeneration.

As to the pneumogastric, when section is made above the superior laryngeal, in addition to the symptom of recurrent paralysis, paralysis of the crico-thyroid muscle takes place and anesthesia of the interior of the larynx results, with the danger of deglutition pneumonia. The pneumogastric is liable to be paralyzed by tumors at the base of the skull or neck, syphilitic pachymeningitis, severance at a surgical operation, etc. The organic causes have to be considered under two distinctly separate divisions, viz., those emanating from the bulbus and spinal column and peripheral ones.

Laryngoscopic examination often leads to discovery of a grave affection; laryngeal subjective symptoms are often absent.

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(1) N. Y. Med. Jour., Dec. 14, 1901.

Recurrent and abductor paralysis, as a rule, develops slowly and gradually. Locomotor ataxia deserves special consideration, as it gave the initiative to the doctrine of the greater liability of the abductor to disease, and as abductor paralysis is the typical laryngeal paralysis observed in tabes. Ataxic movements of the cords and laryngeal crises are also observed in this affection. The pathologic significance of adductor paralysis is inferior to that of recurrent or abductor paralysis. The symptoms are more obvious, but the lesions are of a local nature. The thyro-arytenoid muscle is the first to be paralyzed in progressive laryngeal paralysis from organic affections.

A case of *labio-glosso-laryngeal paralysis* probably due to a cortical lesion of the cerebrum in a girl 9½ years old is reported by G. Variot.[1] The little girl is slightly microcephalic with some facial asymmetry, convergent strabismus, eyes intelligent, contrasting with idiotic expression of the lower part of the face, with a protruding lower lip and escaping saliva. She understands everything but can say only a few vowels, a, e, i, but no consonants; there is paralysis of the right arm, tongue and lips; the pharyngeal reflex is completely abolished. She takes only liquid food and the spoon has to be placed deep in the mouth to enable her to swallow the contents. Her father is an alcoholic. She was not able to nurse and was brought up on cow's milk and was fed with a spoon.

**Neuroses.** Some *functional neuroses* of the throat are recorded by P. McBride.[2] 1. Laryngeal or pharyngeal (?) whistling. 1st Case. On expiration the patient emitted a low, whistling sound, evidently due to contraction of faucial pillars, by the soft palate above and by the base of the tongue below. 2d Case. Whistling without using lips, tongue, pharynx, palate or cheeks by closing the ligamentous part of the glottis and keeping open the part corresponding to the vocal processes. 2. Functional aphonia. Three cases cited. 3. Inspiratory spasm and its relation to functional aphonia. Usually in hysterical females. The only symptom is inspiratory stridor, giving the impression of marked laryngeal obstruction. It may simulate bilateral abductor paralysis, but in this the stridor persists

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(1) Gaz. d. Hôpitaux, Jan. 30, 1902.
(2) Edinburgh Jour., August, 1902.

during sleep, while in inspiratory spasm the patient sleeps quietly.

Felix Semon ascribes it to an abnormal irritability of the bulbar and sometimes of the cortical adductor centers; that peripheral stimuli, particularly those through the centripetal fibers of the vagus which under normal circumstances only reach the medulla, producing abductor tonus, and which on forced respiration cause contraction of the abductors, in the neurosis under consideration exercise their influence on the bulbar abductor center as well, and produce an effect which overbalances the stimulation of the corresponding abductor center. In support of this view he describes a case in which a cold douche produced a sudden change from respiratory spasm to functional aphonia. He assumes that in this case the abnormal stimulus had reached not merely the bulbar, but the cortical center also, and the sudden shock not only removed the overstimulation, but substituted paresis.

In reporting a case of *laryngeal crisis* in locomotor ataxia Chas. J. Orr[1] presents a general summary of a subject too frequently overlooked. This particular symptom of tabes dorsalis occurs in but a small per cent of the cases observed and reported. Coming as it does early in the disease, before the general group of symptoms appear, it is quite often misleading, causing error in diagnosis, failure in treatment, and humiliation to the attending physician.

Frequently laryngeal crisis is accompanied by paralysis. The common laryngeal crisis resembles an attack of whooping cough; the sensation of tickling or choking usually precedes the attack, yet the spasm may develop very suddenly; then we have the very severe attacks with suffocation, loss of consciousness, or even an alarming convulsion. The attack does not usually last more than a few seconds or minutes. Death, however, may occur in one of these attacks.

The different forms of laryngeal crisis may occur in the same patient.

If no laryngeal paralysis is present the local examination may reveal nothing abnormal or only a hyperemic mucous membrane which is very sensitive. The paralysis

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(1) Courier of Medicine, March, 1902.

frequently is revealed at the first examination, and if not present may be expected later; if unilateral it may cause little or no trouble. It is more often bilateral and this causes difficulty in breathing. The voice remains clear, but tires quickly. Hyperesthesia is more common than anesthesia. This laryngeal crisis, when present, is an early symptom of locomotor ataxia.

**Chorea.** A case of laryngeal chorea is reported by James F. McCaw[1]. Diagnosis was based on age, sex and neurotic history of the patient; characteristic noisy, dry bark during the day and ceasing at night, choreic twitchings in other portions of body and negative laryngoscopic findings.

**Stenosis.** The causes of stenosis of the larynx are catalogued by J. Price-Brown.[2]

Congenital laryngeal stenosis may be divided into: 1. Congenital syphilitic stenosis. 2. Vestibular stenosis. 3. Diaphragmatic or Web stenosis.

The principal pathologic conditions producing acquired stenosis are: Neuroses, acute and chronic functional, and organic. Toxic paralysis, acute edema of the larynx, the presence of pseudomembrane, perichondritis, as a result of fracture, fulminating tubercular perichondritis, perichondrial abscess of the cricoid, chorditis inferior hypertrophica of Gerhardt, chronic blenorrhea of Stoerck, syphilis, lupus, leprosy, tuberculosis, glanders, leucocythemia, gout, benign tumors, malignant disease.

External causes: Goiter, abscess, aneurism, enlarged scrofulous glands and neoplasm of the larynx.

A case of very persistent laryngeal stenosis is reported by J. P. C. Griffith.[3] The case occurred in a child 20 months old, who had a similar attack before. The other children of the family had had such attacks when cutting teeth. On examination the cords were found congested, but no microorganisms could be demonstrated. It was probably a case of acute or subacute laryngitis with which was associated a remarkable personal and family tendency to laryngeal spasm, allied to laryngismus stridulus, and depending in part, like it, upon rickets, but differing in its tendency to persistence. The diagnosis is, however, only provisional

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(1) Annals of Otology, Rhinology and Laryngology, May, 1902.
(2) Annals of Otology, Rhinology and Laryngology, August, 1902.
(3) American Med., March 1, 1901.

and open to question. Intubation was resorted to, the case lasting from February 15 to May 20.

W. Courvoisier[1] records a number of cases of amyloid degeneration in laryngeal stenosis observed by himself and others.

In one, examination showed a normal pharynx. The epiglottis was slightly reddened at its base; the plicæ aryepiglotticæ were reddened toward the arycartilage and were slightly edematous. Under the whitish vocal cords on both sides there were red, superficial swellings, touching at the summit; from the posterior wall, between these a tumor projected.

On post-mortem, the posterior wall of the larynx, corresponding to the cricoid cartilage, was thickened to 1 cm., had a yellow brown reddish hue, granular, slightly transparent. Tracheal mucosa reddened. On the left tonsil a small yellowish-red thickening of the mucosa. Circumvallate papillæ yellowish red.

In another, inspection of the fauces showed on the lower border of the left arcus palato-pharyngeus two hard tumors the size of peas covered with normal mucosa; the left tonsil was slightly hypertrophic. With the laryngoscope only the left part of the epiglottis was visible. On the right side over it two round tumors covered with normal mucosa could be seen in the region of the lig. glosso-epiglott. laterale dextrum covering half of the aditus. The epiglottis was on the left fastened to a broad-based tumor, the size of a hazelnut, movable, extending deeply into the laryngeal opening. The growths proved to be fibroids with amyloid degeneration. Clinically these growths caused stenosis partly due to edema.

**Papilloma.** John S. Miller[2] describes three varieties: 1. Numerous small, light-red tumors of uneven surface and broad base, generally thinly scattered. After removal not likely to recur. 2. Whitish gray warty tumors with a broad base, usually found on the vocal cords. After removal they recur very slowly, if at all. 3. This form is exceedingly intractable and is the most dangerous on account of its rapid occurrence and growth, as well as its tendency to undergo epitheliomatous degeneration. It is

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(1) Muench. med. Wochenschr., July 29, 1902.
(2) Phila. Med. Jour., August 16, 1902.

the large reddish tumor, most frequently single. It resembles a cauliflower or mulberry growth, developing very rapidly and invading all parts of the lower laryngeal cavity.

Great tact and skill are required in the clean removal of these growths. Should the growth be removed by morcellation or by taking a bite here and there, the operation is useless, if not positively dangerous. They are stimulated into a heightened activity to return when a feeble or injudicious attack is made upon them.

A case of papilloma laryngis in childhood is reported by W. Lindt[1]. Rosenberg in 5,808 children found 16 cases, Schrötter in 7,324 children found 10 cases. The etiology depends upon constitutional predisposition, as the affection runs in families. An individual predisposition must be accepted and it may be congenital, as in the author's case, the boy was hoarse since birth.

When the diagnosis can be made *per vias naturales,* laryngofissure should never be practiced. But when the papilloma is so large as to threaten suffocation tracheotomy should be performed before any intra-laryngeal manipulation is undertaken. Then if the stenosis allows, the child should breathe through the nose and mouth with the canula closed, so that the function of the larynx may be exercised. Then intra-laryngeal operation should be practiced till the happy time ensues when the papilloma does not reproduce itself. Chromic acid may be applied when possible. The snare or double curette may also be applied.

The author prefers the Lörish catheter. Where tracheotomy is done the fenestrated canula should be worn 4 to 6 months after the growth ceases to reproduce itself. In cases where laryngeal stenosis is removed by laryngofissure the introduction of a glass canula is desirable only when a tracheotomy is done. The operation is easy and harmless, but it affects the voice. Rosenberg recommends intubation, but it requires a good deal of care on the part of both physician and nurse.

Treatment of laryngeal papilloma is summarized by Dunbar Roy.[2] In adults and children suffering with laryngeal papilloma the case should be kept under close observa-

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(1) Correspondenz-Blatt f. Schweizer Aerzte, February, 1902.
(2) Annals of Otology, etc., August 19, 1902.

tion and prolonged treatment with topical remedies such as alcohol and formalin, chlorid of zinc, etc., should be tried before resorting to surgical intervention. In adults, should the mild treatment prove unsuccessful and especially should there be any interference with breathing, the endolaryngeal removal with instruments may be resorted to. In children the interval of mild, expectant treatment should be even longer than in adults, and should the symptoms warrant surgical intervention, prolonged tracheotomy is the safest and surest procedure. Layngotomy should be done only when all the other methods have failed.

**Cancer.** A *carcinoma* of the larynx was operated on with success through the endolaryngeal route by A. Bonain.[1] Indications for the operation: 1. Early diagnosis. 2. Situation favoring complete removal of the growth. 3. Extensive experience in the technic of laryngoscopic surgery. 4. Possibility of submitting the patient after the operation to close periodic examinations. It is safe and more likely to be consented to when the disease is not very far advanced. In late cases the external route is more practicable. Recovery by endolaryngeal route, 33.3 per cent; by thyrotomy, 21.7 per cent.

**Operations.** A case of thyrotomy for laryngeal papilloma is reported by E. F. Parker.[2] After opening the larynx in the usual way a 4 per cent solution of cocain was applied and tissues further bleached and contracted with a 1-1,000 solution of adrenalin chlorid. After curetting the debris, the larynx was thoroughly cleansed and a 30 grain to the ounce solution of silver nitrate applied to the mucous membrane. Hemorrhage was slight. The skin and thyroid cartilage were adjusted with several silkworm-gut sutures, passing at once through both structures. In two weeks the tracheotomy tube was removed and the patient was discharged.

Pellegrino[3] states that 17 cases of *laryngo-tracheal fistula* are on record in European literature, but that all, except one, treated by direct suture of the fistula had resulted in failure, owing, probably, to the excessive mobility of the

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(1) Revue hebdomadaire de Laryngologie, July 19, 1902.
(2) Annals of Otology, Rhinology and Laryngology, May, 1902.
(3) Riforma Medica, Nov. 30, 1901.

trachea and the cough inseparable from the condition. He describes a case of crico-thyroid fistula with cicatricial laryngeal stenosis in a young man, the result of an attempt at suicide. The wound had been sutured, but the sutures came out in a fit of coughing. An incision was made (6 to 7 cm.) from the hyoid bone, dividing the fistula, and the funnel opening was enlarged. The operation was interrupted by apnea, requiring the insertion of a tracheotomy tube. The lumen of the larynx and trachea was then examined and a flap, consisting of a pedunculated piece of mucosa and the conoid ligament with a scrap of cartilage attached, was made. It was drawn to the funnel of the fistula and fastened there. The skin wound was then sutured above and around the tube, but the lower portion was left open for drainage. The tube was removed in twenty-four hours and a larger one substituted, the latter being discarded entirely on the third day. The patient was dismissed on the seventh day, but returned to have the wound dressed and was discharged cured on the fifteenth day. Other methods of plastics include the application of a flap to plug the fistula, or cover the cutaneous opening and Koenig successfully implanted a graft of cartilage. These methods are complicated and are applicable rather to the round fistula, left after long retention of a tube, with obstruction of one or more rings of the trachea, while the surrounding parts are comparatively normal. In a stab wound fistula there is more cicatricial tissue and treatment must conform to the individual indications.

E. J. Moure[1] recommends *immediate suture* of the air passages after operation on the trachea and larynx. Every laryngologist is acquainted with the fact that bronchopulmonary infection often follows operations on the air passages by the external route immediately, or secondarily. Sometimes it is caused by penetration of blood into the air passages during the operations to which the effect of traumatism is added; sometimes it is the cold air entering that causes the pulmonary lesion; sometimes, again, it may be infection of the wound which leads to a fatal ending. The author cites a case of tracheotomy for the extraction of a foreign body which was followed by a double

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(1) Jour. d. Medicine d. Bordeaux, Dec. 15, 1901.

broncho-pneumonia and death. Since then he has given up using a canula and has practiced immediate suture of the wound, with happier results. The author reports a series of cases where he performed the tracheo-thyrotomy for epithelioma of the larynx. When the operation is done before the growth reaches the vocal cords and has not yet involved the arytenoid region, success often crowns our efforts as the statistics of Semon and Goris and the author's experience show. Before doing the median thyrotomy a tracheotomy is performed eight or ten days previously to get the patient accustomed to wearing the canula. The tampon canulas of Trendelenberg or Hahn are to be avoided as they often lead to infection.

Jacques and Grosjean have studied the *broncho-pulmonary complications consecutive to operation* on the upper air passages, especially of the larynx. One of the principal causes of failure of laryngectomy is infection of the wound. The infection reaches the peritracheal cellular tissue and the mediastinum. It also penetrates into the trachea and produces a septic pneumonia. Lethal issue takes place in from eight to fifteen days. Tracheotomy predisposes to pneumonia because the column of air reaching the lungs cannot rid itself completely, through contact with the mucosa of the nasal fossæ and the larynx, of the bacteria it contains. It is also due to the section of the pneumogastric nerve during the operation and to reflex inhibition of the larynx of vasomotor origin. Suggestions of Moure: 1. Reduce to a minimum the traumatism. Excision of the growth, where practicable, should be done instead of extirpation. 2. Remove immediately or as soon as possible sources of irritation of the mucosa after an external opening, as canula, gauze, etc.; avoid every irritation to the nervous system.

In reporting a case in which a part of a *Durham tracheotomy tube fell into the right bronchus*, E. D. Ferguson[1] calls attention to a fault in the construction of some of the Durham tracheotomy tubes as made by even our best instrument makers. There are four parts to the complete apparatus. The outer tube fits into a collar, which can be fixed by means of a set screw at any point on the tube and on securing the shield by tapes around the neck, the

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(1) American Medicine, Feb. 1, 1902.

extremity of the tube is adjusted to rest properly within the trachea. The outer tube should be supplied with a flange to prevent its escape through the collar and into the trachea. The want of it will lead to dangerous accidents. Trzebicky[1] reports two cases of broken tracheotomy tubes. In one the canula could be felt with the forceps just above the bifurcation and extraction was easy. In the second case extraction under narcosis failed but the canula was coughed up when the patient came out of the narcosis.

Gallatti[2] cites 24 cases of *breaking of tracheal canulæ* found in the literature and reports 1 of his own. The accident occurs but rarely in children, but physicians should be prepared to meet the emergency when it occurs and parents should be instructed to have children wearing a canula for a long period, inspected now and then by a physician. With the X-ray the fragment of the tube is located and removed with a metal wire or forceps; when possible, the bronchoscope should be made use of. Bronchotomy through the sternum was suggested by Forrest Willard in 1891.

**Intubation.** Engelman's[3] "tubator" serves both as intubator and extubator. It is similar to O'Dwyer's extubator, with a curve corresponding to the cavum oris, where blades can be separated with the aid of a lever. It consists of a flat handle 10 cm. long, blade-like, curving to a very wide angle 13 cm. from the point of grasp. The second blade represents a system of two levers, with unequal arms, of which the distal one, corresponding to the laryngeal portion, is curved at a right angle. The proximal lever is 15 cm. long, 1 cm. wide, flat, narrowing towards the distal lever. Both are held in contact by means of a "swallow-tail." Downward pressure of the proximal lever causes yielding of the distal so that the pharyngeal portions of both blades become parallel. The latter are furnished in their long axis with a groove, so that in closing they form a canal. Their end has a fine grooving on the outside. For purposes of fixation of the blades there is a closing contrivance.

*Technic.* A tube, threaded with a waxed silk thread (30 cm. long) is put on the end of the instrument and fixed

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(1) Wiener med. Wochenschrift, No. 7, 1902.
(2) Wiener med. Wochenschrift, Dec. 21, 1901.
(3) Wiener med. Wochenschrift, No. 29, 1902.

by pressing down the upper blade and by shutting the teeth of the closing contrivance. The thread is placed in the spur. The handle should lie in the fist, the index finger on the spur, the thumb on the grooved surface of the upper blade. The instrument is introduced, guided with the left index finger through the child's open mouth in the median line of the body. While the left index finger fixes the tube in position, the thumb of the right hand, by pushing the closing contrivance forward, loosens the blades, the ends of the instrument close, the tube is freed and the instrument is removed. The tube is now lowered with a gentle pressure of the left index finger until its head rests on the ary-epiglottic fold. The silk thread is fastened to the child's cheek. For extubation the instrument is introduced on the right surface of the left index finger to the head of the tube, is carefully pulled forward, until the ends sink in the lumen of the tube. By pressing the right thumb on the upper blade the ends press against the tube, the closing contrivance is brought into play, the tube is fixed and can be extracted by lowering the instrument. The instrument is inexpensive.

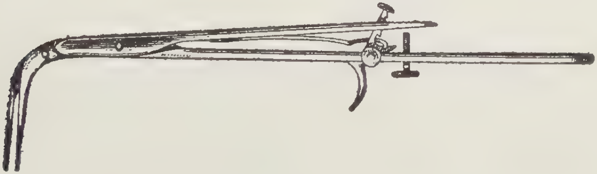

Fig. 35. Engelman's Tubator.

## TRACHEA.

Gustav Killian reports a case of a *primary sarcoma* of the trachea where under direct tracheoscopy the galvanocautery and the cold snare were used to remove the growth. Recovery followed and there was no recurrence after one and one-half years.

**Tuberculosis.** A remarkable case of probably primary tuberculosis of the trachea is reported by Gidionsen.[1]

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(1) Muenchener med. Wochenschrift, Oct. 15, 1901.

There was nothing abnormal about the larynx and although pulmonary tuberculosis had been suspected during the time the patient was under observation (20 months) the post-mortem examination did not disclose any tubercular lesion. Just above the tracheal bifurcation on the posterior wall a small oblong ulcer with ragged edges was found and near this numerous varicose veins. Both bronchi were filled with blood. The regional lymphatic glands were enlarged. A complete post-mortem of all of the organs was not made and therefore the case cannot certainly be said to have been one of *primary* tracheal tuberculosis.

## BRONCHI.

**Bronchoscopy.** Killian[1] describes his method of examining the esophagus, trachea and bronchi by the direct method. An anesthetic is necessary only in the case of children; local anesthesia is preferable in adults and is obtained by painting the pharynx, the aditus laryngis, the left sinus pyriformis, and especially the posterior cricoid region, with a 20 per cent solution of cocain. Patients without a stricture and not troubled with copious salivation, may be examined while sitting on a footstool, the head supported by an assistant. When a stricture is present, the upright position induces an accumulation of saliva above the stricture, occluding the field of vision. Examination of the recumbent patient takes place either in Mikulicz's lateral or in a horizontal position, the patient's head, which is supported by an assistant hanging over the end of the table. Either position is available for general anesthesia. For male adults use tubes 9 to 11 mm.; for females 9 mm.; for children 7 mm. wide. The length of tubes (20 to 50 cm.) varies with the distance of the spot to be examined from the upper incisors. Simple conical bougies are used, as directors, which are made to fit the tube exactly. Electric light condensed by a lens, and reflected by a mirror with a hole in the center, serves for illuminating the tubes. Kirstein's frontal lamp renders excellent service for purposes of examination, and Kasper's handle for demonstration. Before use, focus the lens until a distinct image of

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(1) Journal of Laryngology, Rhinology and Otology, October, 1902.

the carbon filament is obtained and the lower part of the esophagus is distinctly illuminated. It is a good test to examine a finger held up close before the orifice of the tube. Pass the tube past the left pyriformis, directing it with the finger and whilst the patient's head is held backwards. If the patient is unable to recline his head sufficiently, give it a slight inclination towards the right side until the tube is lodged in the left corner of the mouth. As soon as the tube has passed the back of the cricoid, remove the director and push the tube gently deeper, controlling its descent by looking into it. The field of vision is dried by means of swabs and an aspiration pump, the tube of which is passed through the esophagoscope. The handling of forceps, hooks, and other instruments may be practiced on the model for esophagoscopy and bronchoscopy.

*Method of Direct Laryngoscopy.* An anesthetic is employed for children. The patient's head is kept hanging over the end of the table. Introduce a speculum, the proximal end of which is tubular-shaped, and endeavor to lay hold of the cocainized epiglottis with this instrument. Short tubes are passed through the rima glottidis. In adults an anesthetic is not necessary. Local anesthesia is produced by painting the pharynx and the larynx *twice* with a 20 per cent aqueous, or a 25 per cent alcoholic solution of cocain. Excitable patients receive a hypodermic injection of morphin .020 gm. before the examination. Pass the tube without a director, and control its movements under bright illumination by means of Kirstein's lamp. In adults Killian uses tubes 15 to 20 cm. long and 9 to 11 mm. wide; in children 15 to 20 cm. long and 5 to 7 mm. wide. Search at first for the epiglottis, the inter-arytenoid region next, and eventually for the posterior part of the vocal cords. When general anesthesia is employed, the patient is placed in a horizontal position, his head hanging over the edge of the table. Lower direct tracheoscopy can easily be performed on a sitting or recumbent patient after cocainizing the trachea without resorting to general anesthetics. Bend the head slightly backwards and to one side. In adults he uses tubes 5 to 15 cm. long and up to 15 mm. wide. The whole of the trachea, the bifurcation, and the entrance of the main bronchi are plainly visible. The bronchi are best seen by moving the upper end of the tube towards the side opposite to the bronchus to be examined. Lower direct bronchoscopy is an exactly similar method to the last. The main bronchi are painted with a 10 to 20 per cent solution of cocain. This is easy to manipulate in the right bronchus, but on the left side the tube has to be passed down to the entrance of the bronchus and only then one succeeds in cocainizing its mucous membrane. The tube is passed 4 to 5 cm. along the main bronchi, by which means a straightening of the same is induced. By the use of appropriate tubes Killian has been able to penetrate bronchi of the second and third order and to observe the branching of the main bronchus in the upper lobe.

*Upper Direct Bronchoscopy.* This may be executed by passing instruments along the natural passages without resorting to tracheotomy. Adults with sufficient power of self-command who can tolerate cocainization of the larynx, trachea and main bronchi, need no anesthetic especially after a hypodermic of morphin. When local anesthesia is applicable, patients may be examined sitting, otherwise they are placed in a horizontal position, with their heads hanging over the edge of the table. The length of the tubes is estimated by the distance of the upper incisors from the middle of the sternum (with patient's head thrown back) and, as a rule, measures 30 to 35 cm. in adults and 15-25 cm. in infants. Patient sitting, the tube after being warmed and oiled, is passed exactly in the median line. The epiglottis is pushed aside and the tube is passed through the glottis during inspiration. The bifurcation and main bronchi are then easily reached. Patient recumbent, with head hanging over the edge of the table. The passing of the tube is facilitated by an assistant holding the tongue upwards with Kirstein's spatula. The field of vision is cleansed by swabs and the aspiration pump. The handling of instruments is best learned by practicing on Killian's model for bronchoscopy. The article is illustrated with plates.

**Foreign Bodies.** M. F. Coomes[1] discusses the important question of what to do when a foreign body is lodged in the trachea or bronchus. Combining the statistics of Dur-

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(1) Am. Pract. and News, December 1, 1901.

ham, Gross, Weist and the writer we have 2,651 cases, in 1,234 of which there were operations with 964 recoveries. In 1,417 no operation was performed with 1,035 recoveries (73 per cent). It will be seen that all the statistics except Weist's support the consensus of opinion of surgeons that no foreign body should be allowed to remain for any length of time in the air passages without the operation of bronchotomy, but this should be done in urgent cases only when all other means of extrication have failed. The percentage of recovery with operation brought down to date is 84.8 while in the days of Samuel Gross it was 84.7. Asepsis and antisepsis had evidently little effect upon this peculiar operation; perhaps on account of its being a "bleed-out" so to speak, there is little chance for absorption of septic material.

De F. Willard[1] also gives some useful hints as to the removal of foreign bodies from the air passages. Coughing should be encouraged; forcible inspiration restrained. Inversion in the prone position as a domestic practice is advisable. Laryngoscopy is helpful if the body is lodged at the vocal cords. It may be extracted by forceps or by laryngotomy. If time permit, the X-ray may be brought into serviceable use for diagnosis. Careful diagnostic investigation is important to determine the actual presence of an impacted body, and its location. Tracheotomy under local anesthesia should be the rule if the object is lodged at the bifurcation or in the bronchi. Tracheoscopy, suction and forceps manipulation must be cautiously employed. Prolonged instrumentation adds greatly to the danger of pneumonia. If extraction is not secured through the tracheotomy wound, the chest wall should not be invaded unless an artificial respiratory apparatus like the Fell-O'Dwyer is at hand, and oxygen available. With the assistance of these appliances, however, the bronchus may be reached, anteriorly or posteriorly, since by their use, rhythmical movements can be maintained. Resultant abscess of the lung should be treated by incision and drainage.

A. W. de Roaldes[2] suggests the use of the electro-magnet for the extraction of foreign metal substances from the air

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(1) Journal American Medical Association, October 26, 1901.
(2) Revue hebd. de Laryngol. d'Otologie et de Rhinologie, Jan., 1902.

passages. Encouraged by the happy experience of Garel[1] in extracting a nail from the trachea of a child by an electro-magnet, in conjunction with a tracheotomy and by the success with this method at the Eye and Ear Infirmary of New York, the author carried out a series of experiments with satisfactory results.

Cases of foreign bodies in the windpipe are also reported by J. A. Larrabee.[2] The first case was of a boy who swallowed a rivet which lodged at the bifurcation of the trachea. A distinct sound of something slipping down with inspiration and slipping up with expiration was heard. The child died of membranous croup or diphtheria. The rivet was found imbedded under the mucous membrane at the bifurcation of the trachea. The second case was that of a boy who swallowed a grain of corn which lodged in one of the bronchi. During the operation the grain of corn was expelled, together with a quantity of pus. The patient recovered.

J. A. Killian[3] removed a fish bone from the left bronchus in a child of three and a half through the mouth by direct superior bronchoscopy. Superior bronchoscopy enabled the author to see, to seize and remove the foreign body from the left bronchus. Everything was done under the control of the eye, nothing was left to accident. When a foreign body cannot be removed by upper bronchoscopy, lower bronchoscopy should be tried, but the superior is the method for children. In adults superior bronchoscopy should be tried first. When extraction fails tracheotomy should be done. Through the tracheal wound lower bronchoscopy should be made use of.

## ESOPHAGUS.

**Stricture.** Non-malignant stricture of the esophagus is discussed by E. Walker.[4] Stricture of the esophagus is caused by an inflammation and resulting cicatrix. The ingestion of corrosive or boiling substances is the most common cause. Ulceration from foreign bodies, syphilis or

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(1) Annales des Mal. de l'Oreille, du Larynx, etc., 1901, Feb.
(2) American Practitioner and News, December 1, 1901.
(3) Deutsche med. Wochenschrift, Dec. 26, 1901.
(4) American Practitioner and News, Nov. 15, 1901.

tubercle, is often the cause and two cases have been attributed to typhoid fever. Some of these patients regurgitate the food as soon as swallowing is attempted. In these cases the obstruction is high, but where it is near the stomach the esophagus above becomes sacculated and the patient takes considerable food and the regurgitation seems more like vomiting. When symptoms indicate a serious difficulty in swallowing, a bougie or olive-pointed probang should be introduced and if no obstruction exists it can easily be passed.

*Management.* If you are called at the time of the swallowing of the corrosive, take steps to relieve the inflammation; allow only bland liquid food and begin systematic sounding in from two to four weeks. If a foreign body is lodged in the tube remove it before ulceration occurs. External esophagotomy is preferred to long-continued efforts by the mouth. Tubercular or syphilitic ulcers should receive appropriate treatment and the sound used during the period of contraction. In all cases gradual dilatation is best. Soft instruments are preferable in recent cases because safer in inexperienced hands. In firmer strictures bougies with metal or olive tips are needed. When no instrument can be passed and the condition of the patient does not allow of operation a gastrotomy should be performed, a rubber tube introduced and through it the patient nourished until his condition is improved. For a dense stricture above the arch of the aorta and below a point which can be directly divided esophagotomy is the best operation. An external incision is made in the neck, the esophagus is opened, the tenotome is introduced, and the stricture is divided. The most common as well as the most serious strictures are those at the lower end of the esophagus. There are two methods of dealing with these cases.

1. Abbe's method: Through a gastrotomy wound a stout piece of silk is carried in a retrograde way through the esophagus and out through the mouth or an external esophagotomy wound. The stricture is made tense by engaging bougies in it from below. When the string is used as a saw, the tight bands are divided, while the soft parts are pushed out of the way uninjured. After further dilatation has been secured the incisions may be closed or

a rubber tube may be inserted to a point above the stricture and brought out of the gastric incision, the latter being sutured to the margins of the abdominal wound. In two or three days the tube is removed, and sounding from above is employed in the usual manner.

2. Ochsner's operation: The anterior wall of the stomach is drawn out of a left oblique incision through the abdominal wall; a small opening is made into the stomach, sufficient in size to introduce the finger. A whalebone probe, to the tip of which a silk string has been tied, is now passed through the esophagus, either from above or below as in the Abbe method. With this guide a loop of silk is drawn out of the gastric incision in such a manner as to leave the guide as a third string. Into this loop a small soft rubber drainage tube, three feet or more in length, is caught in the middle; by traction on the ends of the double thread through the mouth this loop of rubber tube is drawn through the stomach and made to engage in the stricture. The greater the amount of traction, the smaller the stretched rubber tube, until it is sufficiently reduced in size to enter the stenosed portion. By alternating the direction of the pull the tube is drawn out by its free ends and in by the silk loops. Increasing sizes of tube can be employed, and if necessary the third string can be used as a string saw after the Abbe plan of procedure. The author cites a case of his own where gastrotomy and dilatation of stricture was successfully performed.

The diagnosis and treatment of malignant strictures of the esophagus are carefully considered by Symonds.(1) *Diagnosis:*

*The upper third.* Stricture at the cricoid or beginning just below the ring is always malignant. It begins at from 8½ to 9 inches from the teeth and usually involves 2 or 3 inches. The chief peculiarity is the tendency to cicatrize and contract. Squamous epithelium is usually found. The contraction is irregular. Four conditions give rise to confusion in diagnosis. 1. The one most closely resembling organic disease is dysphagia occurring in elderly people. 2. The nervous form, especially when occurring in men, and in medical men of all others; diagnosis can only be settled by time. 3. The third condition is that of a pharyngeal pouch. 4. Malignant disease of the lower end of the pharynx, involving the arytenoids. The main distinctions are the pain accompanying dysphagia; the voice has the peculiar sound produced by the presence of edematous arytenoids; the growth can be seen in the early stages.

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(1) The Lancet, August 9, 1902.

*The middle third.* A sarcoma or a myoma may occur and may give rise to obstruction. Carcinoma is more common in this location. Aneurism and mediastinal tumors rarely give rise to serious dysphagia. *The lower end:* The lower end, *i. e.,* a point from 15½ to 17 inches from the teeth is the only locality where we find a simple obstruction. 1. Among early symptoms we may have so-called dyspepsia, nausea, and repulsion for food; pain only when the central district is affected. 2. The passage of a bougie is the only way to clear up the case and its employment need not be feared. 3. Extra-esophageal disease rarely gives rise to serious dysphagia. 4. Spasmodic obstruction, apart from the hysterical form has always, when decided, an organic cause and this would be better called intermittent dysphagia. 5. With regard to the three special districts it may be said (a) that all organic obstruction in the upper third is malignant and has a special tendency to cicatrize; (b) that in the central half of the gullet a sarcoma or a myoma, both rare diseases, may cause fatal obstruction, and here also a pouch may give rise to difficulty in diagnosis but can generally be excluded; and (c) that in the lower end alone does simple stenosis occur, and here there may be difficulty in distinguishing from cancer of the stomach, causing great reduction of the cavity. 6. Finally, in estimating the extent of the disease, the special value of the steel bulb is noted and also the use of the Conde bougie in obstruction at the lower end.

*Treatment. Summary.* 1. In cricoid obstruction the long rubber tube gives excellent results. When this is not well borne, gastrostomy is to be resorted to and, if selected, should be performed early. 2. In disease of the central portion the short tube is serviceable in a fair number of cases and when it acts well is superior to any other method. It must be replaced by the long feeding tube when pulmonary symptoms arise. In disease of the cardiac orifice tubage is so uncertain that gastrostomy should be performed when dysphagia becomes serious.

## ANESTHETICS.

M. L. Maduro[1] believes that *nitrous oxid gas and ether* are to be preferred in throat operations. He makes the following suggestions: 1. It should be carefully ascertained that the valves of the gas apparatus fit accurately, thereby establishing the certainty of a rapid exit of atmospheric air from the lungs. 2. A certain amount of rebreathing of nitrous oxid should be allowed in the end of its inhalation in order that a longer gas and a shorter ether anesthesia can be obtained. 3. The transition to ether should be accompanied by a rather free amount of admixture of air through the various inlets in the apparatus without removing its face piece. 4. Lastly, the head of the patient should be well drawn back, and forward pressure made on the jaws at the time of the transition to ether, so that the air may be increased to its utmost. In longer operations the use of chloroform after ether is very often indicated as the attendant secretion of mucus is very much less and one need not remove the face piece during the operation.

*Chlorid of ethyl*, which has been known for a long time as a local anesthetic, is recommended as a general anesthetic by Vacher.[2] In 1895 it produced general anesthesia accidentally in the hands of a dentist. It has been extensively used since for both long and short anesthesia. It should be used chemically pure and then it can be kept in closed glass receptacles. The best way of administering it is with a handkerchief rolled into a cone, covered outside with a sheet of paper fastened with a pin. This compress is saturated with a few c.c. of ethyl chlorid, the cone placed over the nose and mouth, and the patient instructed to breathe deeply through the mouth. In from fifteen to thirty seconds the anesthesia is complete. If anesthesia is discontinued at this point awakening is rapid; if continued the period of contracture sets in, this stage however may

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(1) New York Medical Journal, Feb. 22, 1902.
(2) Annales des Maladies de l'Oreille, etc., June, 1902.

be absent. In a few seconds there is complete muscular relaxation, there is mydriasis, but no cyanosis. There is no trismus as is observed in anesthesia with bromid of ethyl. Anesthesia obtained in thirty or forty seconds lasts from two to four or five minutes. The dose may be repeated two, or even three times. No disturbance whatever on awakening. Used before chloroform it abolishes the period of excitement, anesthesia being induced in five minutes. There is no gastric disturbance as it shortens the period of anesthesia.

D. J. G. Wishart[1] states that *hydrobromic ether* is superior to other anesthetics as the period of anesthesia is short, a sitting posture can be maintained by the patient, the normal color is retained, respiration is not interfered with and the "apparatus" required can be carried in one's pocket.

J. W. Gleitsmann[2] has not had a single accident with the A. C. E. mixture. In 1894 he began the use of *ethyl bromid* on account of its being as safe and to save time. The majority of surgeons prefer complete anesthesia and begin with pouring 10 gms. into an impermeable mask. When bromid is gradually added, narcosis takes place within two minutes. Generally less than 30 gms. are required, in exceptional cases 40 gms. are necessary. For detailed description see the text.

*Intubation of the larynx* as recommended by Kuhn for convenient anesthetizing in certain operations on the head and neck has been again described and recommended by his assistant Krug.[3] The tube used is Kuhn's spiral tube, the same as is made use of for stomach and bowels. Length 15 to 25 cm.; diameter 7 mm. The round section of the tube becomes elliptical in the lower laryngeal portion. Measurements were taken on dead bodies: 1. In adult men: a, distance from teeth to inter-arytenoid space 11.5 to 12 cm.; b, distance from the teeth to vocal cords, 12 to 14 cm; c, distance from teeth to cricoid cartilage, 15.5 to 16 cm.; d, distance between teeth and bifurcation, 24 to 24.5 cm.; section of larynx, 3 cm. 2. For adult women: Distance between teeth and, a, arytenoid cartilage,

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(1) Annals of Otology, etc., August, 1902.
(2) Medical Record, November, 1901.
(3) Wiener med. Wochenschrift, No. 7, 1902.

10 to 10.5 cm.; b, vocal cords, 11 to 12 cm.; c, cricoid cartilage, 14.5 to 15 cm.; d, bifurcation, 23 to 24 cm.; section of the larynx, 2.5 cm.

As to the technic of introduction, on application of tongue forceps and mouth speculum, the index finger of the left hand is placed on the ary-cartilage and with the intubator a sterilized canula is placed in the aditus laryngis and the tube glides easily into the larynx and trachea. The circular curve is the most rational. Trauma is possible but will be indirectly proportioned to the dexterity of the operator. Chloroform is used in these cases in preference to ether, as there is hypersecretion with the latter. Twenty-two cases are cited showing that this method is but poorly adapted to children on account of the reflex irritability of the aditus laryngis and mucosa of the respiratory organs in general. In adults the larynx is treated with cocain or antipyrin. The failures are due to lack of experience in the technic and to insufficient narcosis. This method of intubation is not to replace tracheotomy or O'Dwyer's method, for it can be used only in a state of narcosis. But the peroral intubation should compete with tracheotomy with tamponing of the trachea and will make operations with a hanging head unnecessary. A complete tamponade of the pharynx is possible with this method without even choking or vomiting. This method is especially indicated in strumous cases where there is a high degree of degeneration of the cartilage of the trachea. The peroral intubation simplifies matters, whereas tracheotomy complicates the operation, as well as the after-treatment. The compressibility of the trachea is done away with, suffocation signs are removed and the narcosis is induced without incident. The dangerous asphyxia induced by the effect of chloroform and cocain on the nasal mucous membrane is also done away with.

H. P. Mosher[1] discusses the management of the *anesthetic in operations on the respiratory tract.* He has modified an apparatus which has been used in cleft palate operations for three or four years. The etherizing is accomplished by playing a stream of ether vapor over the patient's mouth. A water bath keeps the ether from freezing in the bottle in which it is vaporized and the ether is forced

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(1) Boston Medical and Surgical Journal, Jan. 23, 1902.

through the tube and into the patient's mouth by a bellows. A valve in the stopper of the ether bottle gives the etherizer a simple method of administering any strength of ether and air desired. A shielded alcohol lamp keeps the bath warm. It was found very satisfactory in nose and throat work. The patient should be kept in the upright position as it gives the best light. If the child is anything more than an infant the services of the nurse in holding the patient may be dispensed with. The assistant puts his left leg in the chair, back of the patient, and holds the head firmly against his knee. Atropin should be given before the operation to prevent the excessive secretion of mucus and collapse from manipulation in the region controlled by the pharyngeal plexus, the stimulation of the latter exercising an inhibitory influence upon the heart action.

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